REPORT OF THE
COUNCIL ON INFORMATION MANAGEMENT

A JOINT STUDY OF METHODS OF ELECTRONIC CONTRACTING AND PROCUREMENT UNDER THE VIRGINIA PUBLIC PROCUREMENT ACT

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

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COMMONWEALTH of VIRGINIA

COUNCIL ON INFORMATION MANAGEMENT

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December 11, 1998

The Honorable James S. Gilmore, III
Governor of Virginia
State Capitol
Richmond, Virginia 23219

Members of the Virginia General Assembly
General Assembly Building
Richmond, Virginia 23219

Dear Governor Gilmore and Members of the Virginia General Assembly:

The Council on Information Management is pleased to submit ***A Joint Study of Methods of Electronic Contracting and Procurement Under the Virginia Public Procurement Act***, as directed by Senate Joint Resolution 36 of the 1998 General Assembly.

We trust you will find the report responsive and informative.

Respectfully submitted,

N. Jerry Simonoff
Director

NJS/lh
Enclosure

A JOINT STUDY OF METHODS OF ELECTRONIC CONTRACTING AND PROCUREMENT UNDER THE VIRGINIA PUBLIC PROCUREMENT ACT

PREFACE

Authority Directing the Study
Senate Joint Resolution (SJR) Number 36 of the 1998 Session of the General Assembly directs the Council on Information Management and certain other agencies and organizations to study jointly methods of electronic contracting and procurement under the Virginia Public Procurement Act. A copy of SJR 36 is attached as Appendix A.

Work Plan
The Council on Information Management implemented a three phased work plan to complete the study effort and prepare the report directed by SJR 36. Phase I included preliminary research, the preparation of a draft report outline, the establishment of an SJR 36 Study Team, individual discussions with each Team member, and a meeting of all Team members to approve the report outline. Phase II was the writing of the report supported by continuing research and consultation with Team members. Phase III included the final coordination and approval of the report by the SJR 36 Study Team.

Study Team Membership
All organizations that are specifically cited in SJR 36 were included as members of the Study Team. Additional organizations were invited to participate as members of the Study Team based on their knowledge, experience or expressed interest in electronic contracting and electronic procurement.

Department of Accounts (DOA)	State Corporation Commission (SCC)
Department of Business Assistance (DBA)	Virginia's Center for Innovative Technology (CIT)
Department of General Services (DGS)	Defense Supply Center Richmond (DSCR)
Department of Minority Business Enterprise (DMBE)	Newport News Shipbuilding Co. (NNS)
Department of Motor Vehicles (DMV)	Christopher Newport University (CNU) / Virginia Electronic Commerce Technology Center (VECTEC)
Department of Transportation (DOT)	University of Virginia (UVA)
Office of the Attorney General (OAG)	Virginia Polytechnic Institute and State University (VPISU)
Virginia Municipal League (VML)	Virginia Association of Counties (VACO)
City of Richmond	Henrico County
Commonwealth Competition Council (CCC)	Council on Information Management (CIM)

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

One of the most significant changes in the history of commerce is presently underway across the United States and, to a somewhat lesser degree, worldwide. Within both the private and public sector, the use of electronic technology is reshaping traditional business practices. This business revolution, most commonly referred to as electronic commerce (EC), is beginning to influence the very nature of how organizations interact with their customers. One specific area of EC where government is beginning to respond is in the use of electronic contracting (Ec) and electronic procurement (EP). At the federal, state and local level, such things as online bidding systems and vendor registration are being used to automate the procurement process.

As is typical with state and local governments across the nation, Virginia's implementation of EC is as varied as the many organizations that make up the Commonwealth. The Virginia Department of Transportation (VDOT) is presently converting to new enterprise software that will give them a significant Ec/EP capability. The University of Virginia (UVA) and Virginia Polytechnic Institute and State University (VPISU), along with the Department of General Services (DGS) and the Department of Motor Vehicles (DMV), have each taken steps to utilize electronic technology in the automation of the procurement process. Almost all state agencies, universities, and many local governments are using some form of procurement card (P-card) and electronic data interchange (EDI) as part of their routine purchasing and payment functions. There is no question that the Commonwealth has begun to utilize EC to improve operations and provide better service to customers, nor is there any question that the automation of the contracting and procurement process has begun in selected state organizations. The question that remains is what are the logical next steps to be taken by Virginia in order to gain full advantage from electronic contracting and procurement.

In addition to answering the specific questions raised in Senate Joint Resolution (SJR) Number 36, this report provides recommendations that suggest the next logical steps to be taken in order to make effective and efficient Ec/EP a widely implemented reality in the Commonwealth. A consensus, which has been derived from discussions with SJR 36 Study Team participants, is that the next steps taken should be broadly permissive in their intent and actively promote the expanded use of Ec/EP. It is also a consensus that, because of the diverse nature of state organizations, mandating Ec/EP through legislative or regulatory changes would not necessarily achieve the most beneficial or cost effective results. This consensus of Study Team participants provides an overarching framework for the final report and, most importantly, the specific recommendations presented in the report.

The Technology of Electronic Contracting and Procurement

Rapid advances in information technology (IT) are dramatically altering traditional business practices. Foremost among these technological advancements is the expanding use of the Internet or World Wide Web (Web) to conduct EC. Within the broader field of EC, electronic contracting and electronic procurement are two of the business operations being most directly affected by IT advances. The following technological advancements will facilitate the implementation of Ec/EP within the Commonwealth of Virginia:

- Powerful New Microprocessors
- Powerful New Application Software
- Flexible Procurement Card Buying
- Rapidly Expanding Internet and Web Site Development
- Enhanced Electronic Security Capabilities
- A Readily Available Electronic Data Interchange Capability

The Benefits of Electronic Contracting and Procurement

Government is continually asked to do more with less. The challenge to reduce paper, increase productivity, provide more services at a lower cost, and make better use of technology are just some of the reasons why federal, state and local government agencies are looking to EC for possible answers. Most governments are already using the basic computer technologies associated with EC, to include electronic mail, EDI, and electronic funds transfer (EFT) in order to lower costs and improve mission performance. Ec/EP utilizes these basic EC technologies but also goes beyond the basic technologies to take advantage of automating the procurement process. In other words, there are additional benefits to be gained from Ec/EP beyond those normally associated with our everyday use of EC technologies. Both government and the vendor derive benefits from Ec/EP.

Benefits to state government include:

- Increased Buyer Productivity
- Expanded Supplier Base
- Lower Prices
- Better Management Information
- Increased Small and Minority Business Opportunities
- Reduced Processing Time
- Just-in-time Inventories
- Better Inventory Control
- Improved Payment Processes
- Wide Availability of Catalogs and Contracts

Many of the benefits found on one side of the Ec/EP partnership are found on the other side as well. In addition, vendors can take advantage of the Ec/EP

systems and business processes that they implement for government procurement throughout their internal organization. This integration of Ec/EP into a vendor's everyday operations brings with it added benefits:

- Increased Operating Efficiencies
- Increased Business Opportunities
- Quicker and More Dependable Payments
- Leveling of the Competitive Playing Field
- Reduced Direct Costs
- Better Problem Resolution
- Invoice Elimination
- Improved Cash Flow and Management

Impediments to Electronic Contracting and Procurement

SJR Number 36 requires the determination of any legal, practical or other impediments that would restrict or prohibit Ec/EP by the Commonwealth. The following paragraphs present an analysis of legal impediments to Ec/EP, with a focus on the Virginia Public Procurement Act (VPPA), and also the practical or other impediments that are not part of law or regulation.

- *Virginia Code § 2.1-7.4.* Virginia Code § 2.1-7.4 was enacted in the 1998 legislative session and authorizes most state agencies to accept the electronic filing of information required or permitted to be filed with such agencies (and to prescribe the methods for reproducing and certifying electronically filed information), but expressly excludes from this authorization "any information required or permitted to be filed pursuant to the VPPA." While a few provisions of the VPPA explicitly refer to filing activity, the prohibition in § 2.1-7.4 probably applies to all submissions of information (to agencies) which have specific legal significance under the VPPA.

- *Virginia Public Procurement Act.* In contrast to the clear prohibition in § 2.1-7.4, potential impediments in the VPPA arise from the more ambiguous issue of whether the use of words such as "written," "in writing," "sealed," or "original work papers" should be interpreted to exclude electronically recorded text. The implementation of Ec/EP, as with any manual procurement system, encompasses a number of distinct activities which are governed by separate provisions in the VPPA. A comprehensive list of VPPA provisions requiring various documents or communications to be "written" or "in writing," as well as some additional allusions to paper processes, are contained in Section V. of the report. In the absence of any definition in the VPPA, arguments can be made both ways on whether electronically recorded text should qualify as "written" or "in writing."

Without examining in detail each of the many specific tasks in the VPPA that theoretically could be converted to a paperless process through implementation

of Ec/EP, the following tasks generally involve a higher volume of activity and therefore merit special interest as potential impediments:

- Announcement of Bid Opportunities and Issuance of Solicitations
- Receipt and Public Opening of Bids
- Sole Source and Emergency Procurements

In summary, if the prohibition in § 2.1-7.4 were removed, the VPPA would still present some potential legal impediments to the full implementation of Ec/EP for certain specific procurement activities. With some exceptions, these are not clear prohibitions, but rather questions of interpretation for the Commonwealth's administrators, tribunals and courts. Amendments to the VPPA, that remove uncertainty or clarify questions of interpretation, would greatly facilitate implementation in the Commonwealth and allow state organizations to take full advantage of the efficiencies provided by Ec/EP.

In addition to legal impediments, there are also some practical or other impediments, not part of law or regulation, which can affect the implementation of Ec/EP:

- Standardization
- Infrastructure
- Security
- Vendor Buy-in and Access
- Training
- Year 2000

Electronic Contracting and Procurement and the Virginia Public Procurement Act

Outside of a limited number of potential legal impediments and questions of interpretation, which are discussed in Section V. of this report and which require legislative action or judicial interpretation, the essential purposes and protections of the VPPA can be safeguarded when implementing Ec/EP. A Commonwealth of Virginia Ec/EP plan, that begins with sound procurement business processes, focuses first on small purchases, and is supported by proven or demonstrated procurement system technology, can generally be implemented under the current VPPA. However, amendments to the VPPA, that remove uncertainty and clarify questions of interpretation, would better facilitate implementation in the Commonwealth and allow state organizations to take full advantage of the efficiencies provided by Ec/EP.

Demonstration Projects

Implementation of EC, to include Ec/EP, has already begun in the Commonwealth. Virginia's implementation of EC, while generally small in scope,

is as varied as the many organizations that make up the Commonwealth. In most cases, agencies, counties, cities and other instrumentality's have begun implementation of EC on their own initiative, using their own approach. An important Study Team consensus is that statewide demonstration projects, that take advantage of existing state EC initiatives, should be used to promote future expanded use of Ec/EP. The most critical or core demonstration project would be the establishment and operation of a Commonwealth central procurement Web site which incorporates both centralized vendor registration and centralized statewide ordering. Funding, in the amount of a $300,000 special appropriation, should be earmarked in an amended DGS operating budget to support possible demonstration project start-up costs.

Potential Implementation Costs Associated with Electronic Contracting and Procurement

Because the costs (and benefits) attributed to Ec/EP can vary widely from organization to organization, and because costs are highly dependent upon the degree to which Ec/EP technology is integrated into a re-engineered procurement workflow, pilot or demonstration projects provide an excellent method to identify and validate implementation costs. It is estimated that a $300,000 special appropriation should adequately support 1999 demonstration projects. One of the most important objectives of any Commonwealth demonstration project would be to identify significant costs that may be incurred with expanded Ec/EP implementation in the years 2000 and beyond. Costs identified during the demonstration projects would also support a cost/benefit analysis of any future expansion plans. The results of this cost analysis effort, including funding recommendations, would be presented to the 2000 session of the General Assembly. The following general categories of costs associated with Ec/EP implementation should be the subject of analysis during all planned demonstration projects:

- System Modifications
- Standardization and Implementation Conventions
- Electronic Commerce Gateway Acquisition and Infrastructure Improvements
- Public Access
- Training and Education
- Vendor (Unique) Related Costs

Implementation Timetable

There are several considerations that will influence the overall implementation timetable of Ec/EP by state organizations. First, aspects of Ec/EP are already being implemented by selected Commonwealth of Virginia (COV) organizations such as VDOT. A strong foundation for a statewide implementation schedule could be established by taking advantage of the Ec/EP work already underway. Second, research indicates that most states are only beginning to automate their

contracting and procurement functions through prototype systems or pilot projects. As a result, state Ec/EP "best practices" are not yet well established. A third important consideration is that all state organizations must give priority to fixing their remaining year 2000 (Y2K) problems during the coming calendar year, 1999. The time and resources expended on Y2K work could have a significant impact on any Ec/EP implementation timetable.

With these considerations in mind, there is general agreement among SJR Number 36 Study Team participants that the logical next step for Virginia is to demonstrate statewide Ec/EP capabilities. Demonstration projects could commence in 1999. The scope and effectiveness of these projects would be maximized if the legal and other potential impediments identified in this report are removed. Successful demonstration projects, taking advantage of the work already underway in some state agencies, could then be used as a strong foundation for the further expansion of Ec/EP throughout the Commonwealth in 2000.

Conclusions and Recommendations

The conclusions, documented in this report, support the following recommendations:

1. Eliminate the impediment to Ec/EP contained in Virginia Code, Section 2.1-7.4.
2. Establish and fund demonstration projects to confirm functional and technical feasibility, better define cost-benefit relationships, validate implementation schedules, establish an Ec/EP infrastructure, educate and gain user acceptance, and identify further issues.
3. Establish a single COV procurement Web site, accessible through VIPNet or other Internet service provider, with appropriate links (to other COV sites) and search capability.
4. Implement standard, one-stop vendor registration through the COV procurement Web site.
5. Promote the expanded use of Ec/EP (through a central COV procurement Web site) for the purchasing of goods up to the VPPA small purchase limit of $30,000.
6. Adopt minimum data element standardization (e.g., vendor code and commodity code) to insure effective Web-based Ec/EP across state organizations and with vendors.
7. Establish sufficient vendor accessible computer sites across the state to assure that Ec/EP is conducted in a fair and impartial manner and that all qualified vendors have access to public business.
8. Promote the expanded use of P-cards for purchases up to $5,000.
9. Promote Ec/EP through training and educational programs across the state.
10. Conduct a comprehensive survey of current Commonwealth Ec/EP programs to establish a realistic baseline for further implementation initiatives.

11. Evaluate possible increased utilization of available EDI software to support Ec/EP expansion across state organizations.
12. Request that the COV Procurement Assessment Task Force, established by Executive Order 30 (98), consider recommended changes to VPPA that would allow state organizations to take better advantage of the efficiencies provided by Ec/EP.

II. INTRODUCTION

One of the most significant changes in the history of commerce is presently underway across the United States and, to a somewhat lesser degree, worldwide. Within both the private and public sector, the use of electronic technology is reshaping traditional business practices. This business revolution, most commonly referred to as electronic commerce (EC), is beginning to influence the very nature of how organizations interact with their customers. While some will argue that EC is only in its formative stages, the pace of EC development has begun to mirror the phenomenal rate of growth that we are seeing in the use of the Internet. Statistics compiled by *Computerworld* magazine indicate that purchasing transactions over the Web will grow from $10 billion in 1997 to over $220 billion in 2001. This dramatic growth in EC is presently being driven by customer demand largely in the private sector; however, that same customer demand is also beginning to have a strong influence on the way federal, state and local governments do business.

One specific area of EC where government is beginning to respond is in the use of electronic contracting (Ec) and electronic procurement (EP). At the federal, state and local level, such things as online bidding systems and vendor registration are being used to automate the procurement process. As an example here in Virginia, the Defense Supply Center Richmond (DSCR) estimates that 82% of their approximately 310,000 1997 contracting actions were handled through sophisticated EC software. The May 1998 issue of *Government Computer News* highlighted some of the progress being made at the state and local level to make EC, Ec and EP a reality. The state of Oregon has implemented an online buying system that "has saved huge amounts of resources and time" according to Rob Rickard, the state's chief purchasing officer.[1] Massachusetts, working together with six other states, has launched a six-month pilot project called EMall to automate the ordering of office supplies, computer hardware and software, and lab and scientific equipment. Participating with Massachusetts are Idaho, New York, South Dakota, Texas, Utah, and Washington in what *Information Week* calls "the most ambitious purchasing effort in the public sector to date, and one of the largest anywhere."[2] Other states, like Wisconsin, are moving incrementally towards full-fledged EC by establishing centralized procurement Web sites that automate at least some of the steps in the procurement process. Still other states, like Florida, are only now beginning the process of going online with their contracting and procurement efforts. The move towards Ec/EP can also be seen at the local government level. Large local jurisdictions, like Los Angeles and San Diego Counties in California, have already taken significant strides toward full online automation of their procurement systems.[3]

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[1] "Web-based procurement lets agencies finalize bids faster," Government Computer News, May, 1998, p.1.
[2] Clinton Wilder, "States Turn to Web Procurement," Information Week, October 5, 1998, p.26.
[3] "Web-based procurement lets agencies finalize bids faster," May, 1998, p.1.

As is typical with state and local governments across the nation, Virginia's implementation of EC is as varied as the many organizations that make up the Commonwealth. The Virginia Department of Transportation (VDOT) is presently converting to new enterprise software that will give them a significant Ec/EP capability. The University of Virginia (UVA) and Virginia Polytechnic Institute and State University (VPISU), along with the Department of General Services (DGS) and the Department of Motor Vehicles (DMV), have each taken steps to utilize electronic technology in the automation of the procurement process. Almost all state agencies, universities, and many local governments are using some form of procurement card (P-card) and electronic data interchange (EDI) as part of their routine purchasing and payment functions. There is no question that the Commonwealth has begun to utilize EC to improve operations and provide better service to customers, nor is there any question that the automation of the contracting and procurement process has begun in selected state organizations. The question that remains is what are the logical next steps to be taken by Virginia in order to gain full advantage from electronic contracting and procurement.

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III. THE TECHNOLOGY OF ELECTRONIC CONTRACTING AND PROCUREMENT

Rapid advances in information technology (IT) are dramatically altering traditional business practices. Foremost among these technological advancements is the expanding use of the Internet or World Wide Web (Web) to conduct electronic commerce (EC). Within the broader field of EC, electronic contracting (Ec) and electronic procurement (EP) are two of the business operations being most directly affected by IT advances. This section of the report identifies the technological advancements that facilitate the implementation of Ec/EP within the Commonwealth of Virginia.

- *Powerful Microprocessors.*

The IT legacy in the Commonwealth and around the world has been one of dependence on large mainframe or mid-sized computers often running user unique application software. Legacy systems involve a significant investment of resources and high levels of control of information and network security. An example of a mainframe used for legacy system operations is that of the Virginia Department of Information Technology (DIT) with its Unisys computer. While legacy systems are generally older, they still provide the needed services to their users with information now flowing over new up-to-date fiber optic networks and with terminals that are now most often powerful desktop or personal computers (PC). The Commonwealth's centralized Personnel Management Information System (PMIS) is an example of a current legacy system operating in a mainframe environment.

While Ec/EP can be implemented within a mainframe or legacy system architecture, it is the development of client-server architecture that will allow for the rapid expansion of Ec/EP throughout the Commonwealth. This new architecture is an outgrowth of the technological advances in microprocessors that have occurred since the late 1980s. The speed and storage capacity of computers has increased in a geometric progression. Desktop systems are no longer single tasking, single user, but multi-tasking and even multi-user. The fastest desktops are now used as "servers," linked to other desktops referred to as "clients." A desktop server can do today what a mainframe did yesterday, only much faster and at a lower cost. Client processors are equally powerful and can easily operate, even in a stand-alone mode, the processing software that is part of any Ec/EP system. The ready availability of powerful desktop microprocessors operating in a network environment comprises a significant technological advancement that will facilitate the implementation of Ec/EP.[4]

- *Powerful Application Software.*

Accompanying the rapid advances in computer hardware, are equally rapid improvements in powerful, multifunctional application software. Companies like PeopleSoft, Oracle and SAP are developing business software that will greatly facilitate the implementation of EC. As an example, Ec/EP-specific software is readily available for critical functions such as electronic catalog systems and electronic bid systems.

Electronic catalog systems allow procurement from an electronic catalog of commodities or services, rather than from a printed catalog. These electronic catalogs are normally made available to customers through a network like the Web. Online shopping is rapidly becoming a business standard. Additionally, in more advanced systems, each and every step in the purchasing process can be performed electronically, with no requirement for a "paper trail." These feature-

[4] "Client-Server Architecture: PC Webopaedia Definition and Links," http://webopedia.internet.com.

rich Ec/EP applications provide a wealth of necessary documentation and information, including sales data and customer payment history. Immediate system links to current inventory information, purchasing status, comparative product information, order tracking, and other follow-up processes are also provided.[5] Two good examples of electronic catalog and direct purchase systems are already in use in the Richmond area. The Defense Supply Center Richmond (DSCR) and Virginia's Department of Transportation (VDOT) both employ electronic catalogs for a wide variety of commodity purchases. DSCR has established a system of access to commercial catalogs that are used on a worldwide basis to procure an extensive variety of military products. VDOT has a similar catalog system to support their mission-related commodity purchases throughout the Commonwealth.

Electronic bid systems are another good example of powerful application software that facilitates the implementation of Ec/EP. Such systems allow electronic submission of bids directly to the procurement office or procurement official that announced the invitation for bids. Unlike electronic catalog systems, the software and supporting business processes for bidding electronically are still evolving. This slower evolution is primarily due to concerns regarding bid security. The federal government has taken the lead in the public sector. Since June of this year, all businesses contracting electronically with federal agencies are to sign up in a Central Contractor Registration system. This registration system is a database of all vendor information, including special codes that identify vendors by the specific commodities or services they provide. Part of the process also includes registration to support electronic fund transfers to vendors, a move designed to further eliminate paper in the contracting process.

A nationwide network of 17 Electronic Commerce Resource Centers (ECRC) helps small to medium sized businesses understand and implement the Federal EC program. These centers also provide classes and technical support. For contracts or purchases less than $2,500, business owners can set themselves up to accept a credit card (procurement card) from the contracting federal agency. For contracts up to $100,000, business owners can search for proposals on the Web or subscribe to a value-added network (VAN).[6]

A Virginia-based organization that makes use of electronic bid technology is Newport News Shipbuilding Company (NNS). The shipyard has extended the dollar limits for its contracts beyond that of the federal government and has supported, through financing and training, a central registration system for its vendors to enable wider participation. As a private enterprise, NNS can and does require that vendors desiring to do business with the shipyard, register in its Ec/EP system.

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[5] "Online Shopping: Questions and Answers," Gartner Group Research Note, November 26, 1996, p.1.
[6] "Feds Push Electronic Bidding and Payments," Jacksonville Business Journal, September 14, 1998, p.1.

- *Flexible Procurement Card Buying.*

The use of procurement cards (P-cards) is beginning to have a major impact in both private industry and the public sector. P-cards represent the simplest form of Ec/EP and have the potential to significantly reduce the costs of non-critical, small-volume purchasing for many enterprises. Procurement cards are really nothing more than corporate credit cards, but with a number of value-added features. In the simplest of applications, a cardholder buys from either a print or electronic catalog, and the billings are sent to the cardholder's purchasing department. In a more sophisticated application, an organization can issue a multitude of cards to different groups with different charge codes. In this application, the card vendor then submits the billings to the organization in an electronic format for the "charge-back" processing against different budgets. The most important feature of advanced P-card applications is that they can be fully integrated into the organization's procurement and payment system.[7] Virginia's Department of Accounts (DOA) has instituted a widely utilized P-card program throughout the state. The program, now four years old, is used by the majority of state agencies and handles $6,000,000 per month in transactions statewide. The upper limit of purchasing authority on each individual P-card is controlled by the respective agency, but cannot exceed $5,000. At Virginia Polytechnic Institute and State University (VPISU), for example, over 400 P-cards are currently in use. VPISU has chosen a $2,000 limit for any card in their system. In 1997, the University had $3,000,000 in purchases with the average purchase being $174. The reconciliation procedures, however, are still manual.

- *The Internet and Web Site Development.*

Of all the technologies that facilitate implementation of Ec/EP, foremost is the World Wide Web. The technology of the Web has matured at lightning speed since the early 1990s. In 1993, there were approximately 50 Web servers with 10,000 pages of searchable information on line. Today, it is estimated that the number of pages of searchable information is in the billions.[8] More importantly, because of the equally dramatic advances in microprocessor and software technology, Web search engines now operate in microseconds. It is the power and speed of the Web, coupled with world wide access, that is driving the rapid expansion of EC in general and Ec/EP in particular. The Commonwealth is clearly part of that expansion with the establishment of the Virginia Information Providers Network (VIPNet) as the statewide Web-based network. VIPNet provides a potential Web link for every organization or facility across the state that will greatly facilitate the implementation of Ec/EP in Virginia.

In order to take advantage of the Web as a backbone for statewide Ec/EP implementation, a single Commonwealth procurement Web site or some form of

[7] "The Business Value of Electronic Commerce, Part 4: EC Use by Business Function," Inside Gartner Group, October 25, 1995, p.1.
[8] Robert Cailliau, http://www.w3.org/history.html

integrated or linked organizational procurement Web sites should be established. At this writing there are about 125 Web sites for Virginia's agencies, boards, colleges, commissions, councils, and universities. Most display only static information, but some have modest levels of interactivity, electronic mail support, or database functions. A central Commonwealth procurement Web site would probably be among the most sophisticated of state sites, with high volume, highly interactive content and full-time support.

- *Enhanced Electronic Security Capabilities.*

Internet or any network access for the purpose of EC demands effective electronic security coupled with sound information security policies and procedures. Providing and managing secure access to the Web for any purpose, especially Ec/EP, is one of the most demanding IT challenges. Traditional IT security measures, to include the use of password protection, security logs, firewalls, and encryption, are in place throughout state organizations. These traditional security measures will continue to play an important role in implementing Ec/EP. Beyond these traditional measures, however, are some new technologies that will further facilitate the implementation of Ec/EP in the Commonwealth.

As organizations seek to raise the level of security applied to EC in general and Ec/EP transactions in particular, many will move to cryptography-based security systems such as digital signature. When transaction confidentiality, message integrity, authentication, and nonrepudiation are of paramount concern, cryptography based systems are the answer. Cryptography involves the transformation of data to hide its information content, prevent its undetected modification and unauthorized use. Cryptography can scramble a message to prevent unauthorized viewing (i.e., confidentiality), detect if the contents of the message have been changed (i.e., message integrity), verify the identity of the connecting user or device (i.e., authentication), and provide proof of the integrity and origin of data (i.e., nonrepudiation). Together, these functions prevent attacks on an Ec/EP server or network that would allow the interception of classified, sensitive or proprietary information. Businesses that are heavily networked and communicating electronically with customers and suppliers are becoming very concerned about the need to keep proprietary data private. Digital signature technology can provide the increased level of security that EC demands. Digital signature technology utilizes key-based encryption to protect transactions between trading partners. Simply stated, there are two keys or mathematical codes: a public key and a private key. Partner A publishes a public key. Partner B uses this public key to lock up (encrypt) a bid it wants Partner A to read, and then B sends A the scrambled message through the Ec/EP system. A uses its private key, which only A knows, to unlock (decrypt) the bid. Public

key encryption also gives an organization the ability to attach a digital signature to a message that verifies that only that organization could have sent that bid.[9]

Both public and private sectors of our economy are now making extensive use of biometrics. This new technology uses "the body as password" to provide better security, increased efficiency and improved service. Indeed, biometrics could become the passwords and personal identification numbers (PINs) of the 21st century for all of EC. Biometrics is the automated technique of measuring a physical or behavioral characteristic of an individual, and then comparing it with one that has been previously stored to determine if the characteristics are similar enough to confirm identity. Biometric technology employs various physical characteristics, such as facial features, features of the eye, fingerprints, handwriting and signatures, and voiceprints. The unique advantage of biometric scanning is that it bases recognition and security on unique and intrinsic human characteristics that are extremely difficult, if not impossible, to duplicate or forge. That cannot be said of traditional security systems using passwords, secret codes, PINs, keys, badges, tokens and access cards that are easily lost, forged, duplicated, stolen or forgotten.

Electronic signature or signature verification is a form of biometrics-based security that is seeing increased utilization in EC. Signature verification uses computer technology to record pen or stylus speed, pressure, direction and related characteristics. Several large retailers have examined signature verification systems as a way to reduce fraud. Organizations are also looking at electronic signatures as an Ec/EP security measure to be used in place of more complex digital signature systems. More likely, large scale Ec/EP systems will utilize some combination of electronic and digital signature depending on criteria such as contract value and the possible disclosure of pricing or proprietary information.[10]

The application of electronic signature security is already playing an important roll in the Virginia Department of Transportation's current enterprise software project. VDOT is implementing one of the most advanced Ec/EP systems in the Commonwealth. As part of the Integrated Document Management System (IDMS) Project, VDOT plans to use electronic signatures to authenticate various types of documents to include purchase transactions. In addition to electronic signatures, VDOT is looking at the use of digital signature technology as an even more advanced method to secure sensitive and proprietary data. Newport News Shipbuilding is also looking at cryptography based security systems to handle their highly classified business communications.

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[9] D. Gillmor, "How to Make Encryption Work for You," San Jose Mercury News (Technology Section), July 24, 1998.

[10] J. D. Woodward, "Believing in Biometrics," Information Security Magazine, October 13, 1998.

- *A Readily Available Electronic Data Interchange Capability.*

Electronic data interchange (EDI) continues to play a significant roll in electronic commerce. It enables organizations to exchange business information electronically, meaning much faster, cheaper and more accurately than is possible using paper-based systems. In EDI, the electronic equivalent of common business documents, such as requests for quotes or purchases, purchase orders, invoices, etc. are transmitted electronically between trading partners. These electronic documents are given standardized electronic formats established by the American National Standards Institute (ANSI X12 for EDI is an example) so that everyone can correctly interpret the information that is sent to them. Value-Added Networks (VANs), companies similar to long-distance phone companies, provide the needed telecommunications connectivity between trading partners. Special proprietary software is used to translate the business data at both ends of the channel. As an example, an organization using EDI can transmit a request for quotation to all registered trading partners for a specific commodity. The buyer reviews all responses using some form of bid evaluation software, decides which contractor to buy from based upon selection criteria, and then transmits a purchase order. The contractor responds by transmitting a purchase order acknowledgment, ships the product, and transmits an invoice to the buyer. Upon receiving the goods, the buyer transmits a payment order to the contractor while sending the funds using electronic funds transfer (EFT). There are EDI based systems operating today that perform most Ec/EP functions with little human intervention.

When discussing the technologies that facilitate Ec/EP, there is some confusion about the respective merits of EDI based systems versus Web and other open network based Ec/EP systems. Several companies have developed EDI based systems that can be used on the Web; however, most EDI security and transmission protocols are still highly dependent on the service provided by VANs. While VANs possess the technical capability to send and receive EDI documents through the Web, their high additional cost is a hindrance. The Web itself does not offer security of the transmission medium since traffic flows over circuits owned and operated by many different organizations. In Web based systems, high level security can only be implemented through the use of software with encryption capabilities. There are costs and benefits associated with EDI/VAN, EDI/Web or non-EDI Web based approaches. It is the flexibility of Web based systems over EDI/VAN based systems, however, that seems to be drawing businesses to the Web. Whether EDI or non-EDI, the flexibility of a Web based approach would better facilitate the implementation and future expansion of Ec/EP in the Commonwealth. The state has already made an investment in EDI software. EDI has been used for several years by the Department of Accounts to process and pay invoices. In 1997, 80% of all of Virginia's account payable transactions were handled electronically through EDI.

IV. THE BENEFITS OF ELECTRONIC CONTRACTING AND PROCUREMENT

Government is continually asked to do more with less. The challenge to reduce paper, increase productivity, provide more services at a lower cost, and make better use of technology are just some of the reasons why federal, state and local government agencies are looking to electronic commerce (EC) for possible answers. Most governments are already using the basic computer technologies associated with EC, to include electronic mail, electronic data interchange (EDI), and electronic funds transfer (EFT) in order to lower costs and improve mission performance. Electronic contracting and procurement (Ec/EP) utilizes these basic EC technologies but also goes beyond the basic technologies to take advantage of automating the procurement process. In other words, there are additional benefits to be gained from Ec/EP beyond those normally associated with our everyday use of EC technologies. Both government and the vendor derive benefits from Ec/EP. The following information, which briefly describes the benefits that can accrue to each party, is taken from the Federal Electronic Commerce Acquisition Team report entitled *Streamlining Procurement Through Electronic Commerce*:[11]

Benefits to State Government

- *Increased Buyer Productivity.* Ec/EP utilizes the electronic processing of procurement data, which results in a more efficient execution of purchase orders. Repetitive, time consuming functions such as data entry, reproduction, mailing, telephoning and file handling are eliminated. This allows buyers to become more professional and to focus on exceptional or difficult contracting activities that may require special attention. Ec/EP will permit the buyer to solicit, receive, and analyze quotations, issue orders and notices of award, and distribute the orders without creating paper documents. As internal systems are created or re-engineered to permit a requisition to be received electronically and award information transmitted in the same manner at the same time, the entire procurement process will become faster, more efficient, and more responsive. Reduced transaction costs, which free funds for other critical missions, and faster delivery to the customer are secondary benefits.

- *Expanded Supplier Base.* Ec/EP allows for a much wider dissemination of procurement opportunities, which will result in more vendors vying for government business.

- *Lower Prices.* Ec/EP provides more vendors the opportunity to do business with the government, thereby increasing competition. The increase in competition among vendors will generally result in lower prices. The price

[11] "Streamlining Procurement Through Electronic Commerce," the Final Report of the Federal Electronic Commerce Acquisition Team, October 13, 1994.

reduction achieved will be most dramatic immediately following implementation of Ec/EP, with prices leveling off as the program matures. Patrick Guerra, vice president of corporate supply management for Advanced Micro Devices Inc. in Sunnyvale, California, estimates that his company saved 10 to 11 percent ($30 million) of their $300 million annual office supply budget when they automated their purchasing system.[12] Competition will also help to prevent price gouging and other non-economic reasons for price increases. As Ec/EP systems mature, best-value procurements can actually result in higher quality suppliers and products.

- *Better Management Information.* Producing and moving Ec/EP data electronically can greatly enhance the management of that data. Specific transactions or business processes can be tracked from vendor registration through customer delivery and receipt. Internal control is enhanced with more reliable status information, flexible reporting options, and real-time acquisition, inventory and financial planning.

- *Increased Small and Minority Business Opportunities.* If properly implemented, Ec/EP can increase the opportunity for small and minority owned businesses to participate in the procurement process. The utilization of such techniques as central vendor registration can result in business flowing to a much broader and diverse supplier base. Access to statewide purchasing and contract opportunities can increase the economic base of individual vendors and potentially stimulate sectors of the economy not previously affected by government procurement.

- *Reduced Processing Time.* Because the processing time needed to move data between the parties involved is reduced significantly, Ec/EP can reduce the total actual time between the award and delivery of goods. Many of the time benefits realized by the buyer are also realized by the seller. This combines to reduce the entire procurement cycle significantly.

- *Just-in-time Inventories.* Just-in-time is a cost saving technique developed by manufacturers to reduce inventory and operating capital requirements. Ec/EP information is used to insure that inventory items arrive just-in-time for the manufacturing process. This same technique can also apply, to a lesser extent, to government stock levels. The greatest benefit would accrue to state agencies that require substantial inventory levels of numerous items to meet their missions. Ultimately, some agencies would automate inventory management so that replenishments are ordered electronically as needed.

- *Better Inventory Control.* The ability to employ just-in-time inventory techniques, promote direct delivery, use existing distribution channels, speed the internal order process, reduce mail time, and eliminate paper-based

[12] Jim Kerstetter, "E-Com Treasure Chest: Buying Office Supplies," PC Week, October 5, 1998, p. 1.

process delays will result in better managed and controlled, if not reduced, inventories.

- *Improved Payment Processes.* Ec/EP provides for the quick, easy and accurate flow of purchase order or contract data that all but eliminates payment problems and late payment charges. Ec/EP enhances the use of EFT by providing for electronic matching of ordering and receiving information. Invoice processing time is reduced or eliminated, and prompt payment discounts are more common. The government can negotiate lower prices based on its ability to pay faster and the associated beneficial increases in vendor cash flow.

- *Wide Availability of Catalogs and Contracts.* As Ec/EP matures, electronic catalogs and purchase order type contracts can be made widely available for use by organizations throughout the state. This enhances competition and lowers prices. Vendors would provide electronic catalogs and updated pricing to the government, which would eliminate the need for paper-based catalogs and contracts in each organization. The catalogs and latest pricing information, maintained and updated by each vendor, could be accessed through a single state procurement Web site. This approach would provide organizations ready access to potential sources of supply and would allow for on-line comparison shopping and best value procurements.

Benefits to Vendors

Many of the benefits found on one side of the Ec/EP partnership are found on the other side as well. In addition, vendors can take advantage of the Ec/EP systems and business processes that they implement for government procurement throughout their internal organization. This integration of Ec/EP into a vendor's everyday operations brings with it added benefits:

- *Increased Operating Efficiencies.* In much the same way that Ec/EP makes the government buyer more productive, it allows the vendor to operate more efficiently. Manual processing is eliminated. This speeds the vendor's business processes and virtually eliminates the errors inherent in manual processing. The vendor's management information systems can be fully integrated with their business operating systems to improve overall performance and reduce costs.

- *Increased Business Opportunities.* The use of Ec/EP gives all vendors the opportunity to supply the requirements of all government organizations. As more and more government entities move to Ec/EP, it will allow local businesses to compete on a national scale for contracts. By lowering the cost of finding and bidding on government procurements, more opportunities are available to each vendor to allow them to expand their business base.

- *Quicker and More Dependable Payments.* Ec/EP will expand the utilization of EFT, resulting in quicker and more dependable payments to vendors. Invoices will be processed faster and eventually be eliminated.

- *Leveling of the Competitive Playing Field.* Regardless of business size and geographic location, all vendors will have instant and equal access to government requirements.

- *Reduced Direct Costs.* Ec/EP will reduce the amount of time and resources dedicated to managing the operation of a paper based system, keying and re-keying data into various information systems, paying postage, maintaining stocks of supplies and storage for paper products, and maintaining a manual audit trail for transaction reconciliation.

- *Better Problem Resolution.* Ec/EP and EDI help to minimize the time spent identifying and resolving inter-business problems. Many problems come from simple data entry errors somewhere along the procurement process. When data is only entered once, errors are reduced and problem resolution is made easier.

- *Invoice Elimination.* Procurement process reengineering, along with the implementation of integrated Ec/EP, EDI, and EFT systems, allows for the introduction of simple receiving reports in place of invoices. Vendors could be paid through a receiving system, in which award acknowledgements and receiving reports provide all the data necessary for payment.

- *Improved Cash Flow and Management.* Ec/EP can improve vendor cash flow by reducing lags in government payment times and improving payment and accounting data accuracy. Both the vendor and the government also benefit from better financial controls and improved error resolution in the event of disputes.

V. IMPEDIMENTS TO ELECTRONIC CONTRACTING AND PROCUREMENT

Senate Joint Resolution (SJR) Number 36 requires the determination of any legal, practical or other impediments that would restrict or prohibit electronic contracting and procurement (Ec/EP) by the Commonwealth. This section of the report is divided into two subsections. The first subsection presents an analysis of legal impediments to Ec/EP, with a focus on the Virginia Public Procurement Act (VPPA). The second subsection presents practical or other impediments that are not part of law or regulation.

Legal Impediments

- *Virginia Code § 2.1-7.4.* Virginia Code § 2.1-7.4 was enacted in the 1998 legislative session and authorizes most state agencies to accept the electronic filing of information required or permitted to be filed with such agencies (and to prescribe the methods for reproducing and certifying electronically filed information), but expressly excludes from this authorization "any information required or permitted to be filed pursuant to the VPPA." While a few provisions of the VPPA explicitly refer to filing activity, the prohibition in § 2.1-7.4 probably applies to all submissions of information (to agencies) which have specific legal significance under the VPPA. Accordingly, the agencies subject to § 2.1-7.4 probably cannot accept the electronic filing of bids, proposals, invoices, findings, certifications and approvals which are submitted to, or otherwise filed at, the agency pursuant to various provisions of the VPPA. While this may constitute a significant legal impediment for a purely electronic procurement and contracting system, in practice many of the efficiencies of an electronic system may be attainable despite § 2.1-7.4. For example, § 2.1-7.4 applies only to filings. It would not preclude agencies from electronically disseminating information, e.g., procurement solicitations. Further, while the matter is not free from doubt, § 2.1-7.4 also should not be read as prohibiting every receipt of information in electronic form, but rather should apply only to receipts which are expected to have specific legal significance under the VPPA. Thus, § 2.1-7.4 should not be read as precluding agencies from receiving and using electronic copies of documents when the original has been filed in paper form under the VPPA, e.g., electronic copies of invoices already submitted in paper form, and should not be read as precluding electronic systems to facilitate contract administration, e.g., catalog systems to facilitate the placing of orders under existing state-wide contracts. In summary, § 2.1-7.4 is a significant impediment to Ec/EP but does not preclude every effort to automate public procurement.

- *Virginia Public Procurement Act.* In contrast to the clear prohibition in § 2.1-7.4, potential impediments in the VPPA arise from the more ambiguous issue of whether the use of words such as "written," "in writing," "sealed," or "original work papers" should be interpreted to exclude electronically recorded text. The implementation of Ec/EP, as with any manual procurement system, encompasses a number of distinct activities which are governed by separate provisions in the VPPA. A comprehensive list of VPPA provisions requiring various documents or communications to be "written" or "in writing," as well as some additional allusions to paper processes, are as follows:

  filing of written determinations, justifications and approvals to authorize various deviations from usual procedures (§§ 11-41, 11-37, 11-39, 11-40.C, 11-40.2, 11-41.2:2, 11-45.G, I and K, 11-55.A, 11-62.11.1.b, and 11-68);

posting and newspaper publication of bid opportunities (§ 11-37);

issuance of written solicitations (§ 11-37);

receipt and public opening of sealed bids (§§ 11-37, 11-41.A);

filing of written requests to withdraw construction bids, maintenance and filing of related original work papers, and written denials of withdrawal requests (§ 11-54.A and F);

preliminary and final written notices of ineligibility or nonresponsibility (§§ 11-63.A and 11-65.A);

filing of written protests and issuance of responses (§ 11-66.A);

filing of contractual claims and notices of intent in writing, as well as issuance of final decisions on such claims (§ 11-69.A and B);

issuance of written administrative appeal decisions (§ 11-71.A); and

filing of written ethics notices and certifications, and false writings (§§ 11-76, 11-79.1, and 11-79.2).

In the absence of any definition in the VPPA, arguments can be made both ways on whether electronically recorded text should qualify as "written" or "in writing." Under one view, ordinary usage of these terms connotes a readable piece of paper or similar medium. However, a contrary view is also supportable. Under that view, a communication is "written" if it is not oral, i.e., if the words are recorded in some durable, perceptible medium. In the VPPA, public bodies enjoy "broad flexibility in fashioning details" of the competition (§ 11-35.G) which would tend to support any reasonable definition clearly adopted by the public body. However, at this time there does not appear to be any authoritative guidance from the Virginia Supreme Court or from official opinions of the Attorney General to resolve this question under the VPPA. In addition, the purpose to be served by requirements for writings and similar terms in each of the above provisions, and hence the meaning to be given to such terms in those provisions, is not necessarily uniform throughout the VPPA.

Without examining in detail each of the many specific tasks that theoretically could be converted to a paperless process through implementation of Ec/EP, the following tasks generally involve a higher volume of activity and therefore are likely to be of greatest interest.

Announcement of Bid Opportunities and Issuance of Solicitations. VPPA § 11-37's definitions of competitive sealed bidding and competitive negotiation call for posting of notices in a "public area" and publication of notice in a "newspaper." These provisions also require issuance of a "written Invitation to Bid" or "written Request for Proposal." Publication in a newspaper is a paper process. The other VPPA provisions also might be interpreted as requiring a paper process, but as previously established, contrary interpretations are also possible. Of course, these sections impose no impediment when Ec/EP is implemented to supplement, rather than replace, the paper process.

Receipt and Public Opening of Bids. VPPA § 11-37's definition of "Competitive sealed bidding" calls for "public opening" of bids. This must be read in light of the § 11-41.A requirement that the bids, as submitted, must be "sealed." The essential characteristics of sealed bids include the inability of purchasing officials to determine the content of bids until they are opened. The opening process, which can be conducted in public and which irreversibly changes the bid package in a readily perceivable way, provides assurance to the public that they are witnessing the first opening of each bid. If a technical solution within an Ec/EP system can satisfy these requirements, it is possible that § 11-37 can be construed to permit use of that technology for receipt and opening of bids. Currently, this argument is moot because Virginia Code § 2.1-7.4 prohibits the electronic filing of bids or proposals.

Small Purchase Procedures. VPPA § 11-41.F authorizes the adoption of small purchase procedures not requiring competitive sealed bidding or competitive negotiation. The only express requirement or limitation, which the VPPA imposes on the substance of these purchasing procedures, is that they must provide for competition wherever practicable. Therefore, the VPPA does not preclude the use of Ec/EP for small purchases. However, the procedures to be adopted may apply only to "single or term contracts if the aggregate or the sum of all phases is not expected to exceed $30,000." Therefore, under the current form of § 11-41.F, public bodies can adopt an Ec/EP system for the purpose of fulfilling *bona fide* small purchase requirements, but not for the purpose of avoiding formal procedures by artificially dividing large purchases into smaller parts.

Sole Source and Emergency Procurements. VPPA §§ 11-41.D and 11-41.E authorize procurements without competitive sealed bidding or competitive negotiation when there is only one source practicably available for that which is to be procured and in the case of an emergency. These VPPA provisions require a "written" determination for the files, and a "written" notice to be posted in a "public area" or "published in a newspaper." These provisions may be interpreted as requiring a paper process. While such interpretations are subject to debate, the outright prohibition in § 2.1-7.4 makes this issue

moot as to the filing of the determinations required for emergency and sole source purchases.

In summary, if the prohibition in § 2.1-7.4 were removed, the VPPA would still present some potential legal impediments to the full implementation of Ec/EP for certain specific procurement activities. With some exceptions, these are not clear prohibitions, but rather questions of interpretation for the Commonwealth's administrators, tribunals and courts. Amendments to the VPPA, that remove uncertainty or clarify questions of interpretation, would greatly facilitate implementation in the Commonwealth and allow state organizations to take full advantage of the efficiencies provided by Ec/EP.

- *Issues Unrelated to Technology.* The VPPA prohibits certain electronic purchasing activities, not because they are electronic, but rather because they automate a process that would be illegal no matter how it is accomplished. For example, a central feature of the VPPA is its preference for a competitive process under which the buyer defines the terms of the transaction uniformly for all sellers, and the sellers then come to the buyer to compete for that contract. This structure does not mandate a paper process, but it is inconsistent with a particular way in which certain Internet purchasing opportunities currently are offered by industry (i.e., Internet purchasing under which sellers individually define the terms of their offers, and the buyer then shops for the best deal among several potential sources). The underlying issue here does not relate to the merits of electronic versus paper methods or whether statutory wording could be improved in light of modern technology, but rather the issue here relates to the merits of mandating competitive sealed bidding as the preferred public purchasing procedure.

- *Statute of Frauds.* To be enforceable, certain contracts for the purchase of goods or services (or a memorandum indicating the existence thereof) must be in writing and signed by the party against whom enforcement is sought, or by his or her agent. With certain exceptions, such a requirement applies to the purchase of goods for a price of $500 or more, other sales of personal property (e.g., intellectual property) for more than $5000, service agreements that are not to be performed within one year, and bonds. See §§ 8.2-201, 8.1-206, 11-2(8), and 11-2(4). The use of electronic signatures and electronic records to satisfy signature and writing requirements in statutes of frauds generally is an unsettled issue. See e.g., Nimmer, 14 J. Marshall J. Computer & Info. L. 211, 225-228 (1996). As of 1996 in Virginia, however, it is clear that electronic signatures can satisfy the requirement for a signature. See §§ 59.1-468.A and 59.1-469. This statute does not expressly validate electronic records as "writings." While the intent of the statute may imply such validation, there does not yet appear to be any case law interpreting § 59.1-468.A and the issue is therefore not necessarily resolved in Virginia.

Other Impediments

In addition to legal impediments, there are also some practical or other impediments, not part of law or regulation, which can affect the implementation of Ec/EP.

- *Standardization.* In a recent article in *PC Week*, the authors emphasized that many organizations are facing a virtual Tower of Babel as they strive to expand their Ec/EP networks to multiple suppliers and customers. The issue of Ec/EP system standardization, whether dealing with application software, data base and data element management or even business processes, can become a significant stumbling block on the road to electronic procurement. As an example, vendor catalogs can look significantly different. Because of the intense competition in certain industries, like the computer industry, vendors often believe their unique supply chain systems give them a competitive edge in their private business dealings. As a result, some vendors may be hesitant to modify their catalog(s) to fit a statewide standard. Even across state agencies, the use of different Ec/EP software can pose an integration challenge. Private industry has already run into significant difficulty when trying to put together non-standard EC components (e.g. procurement applications together with Web based electronic catalogs and electronic product tags) from different vendors. There is presently some momentum to establish EC standards that can be applied in both the public and private sector. The RosettaNet project is a good example of private companies joining together to establish a standard business language for the high tech industry; however, some large businesses like Gateway, Inc. and Dell Computer Corp. have yet to sign up.[13] The American Law Institute is working with a number of national and international organizations to adapt the Uniform Commercial Code to electronic commerce, but that effort is also moving slowly. Standardization is not an absolute roadblock to the implementation of Ec/EP in the Commonwealth; however, standardization issues must be viewed as potential impediments during the implementation process.

- *Infrastructure.* The implementation of Ec/EP requires a relatively advanced level of information technology (IT) development. Discussions with members of the SJR 36 Study Team indicate that there are disparate levels of automation maturity and infrastructure development across the Commonwealth. Organizations like Newport News Shipbuilding Co. (NNS) and VDOT are at a level of IT development that allows them to implement Ec/EP without significant difficulty. Some Commonwealth small businesses and municipalities, at the other end of the spectrum, are operating today with very basic IT resources. As with standardization, this is not an absolute

[13] "E-com's Rosetta Stone," PC Week, July 27, 1998, p.1.

roadblock; however, infrastructure inequalities may impede a rapid, broad-based implementation of Ec/EP in Virginia.

- *Security.* The technology to conduct secure Ec/EP over the Web is available. That security technology, however, is relatively new and untested in large-scale procurement applications. Security software performance issues, maintenance questions, encryption and decryption key management, problematic VAN to Web interconnections, are just some of the security related issues that may impede the implementation of Ec/EP.

- *Vendor Buy-in and Access.* Vendor buy-in and access, closely related to issues of standardization, infrastructure and security, can become an impediment depending on how Ec/EP is implemented in the state. Any statewide Ec/EP implementation plan that fails to address vendor concerns, such as fair and impartial procurement procedures and access to state business without arbitrary exclusion, will not succeed. A more detailed discussion of these concerns is contained in Section VI of this report, which looks at the purposes and relevant protections of the VPPA. Vendor perception that Ec/EP is being implemented in the Commonwealth without appropriate attention to VPPA protections is a potential impediment.

- *Training.* One of the major challenges to successful implementation of Ec/EP is training. An effective implementation program must include training for state employees using the new Ec/EP systems and also training and outreach for the vendor community. The absence of such a program will clearly act as an impediment to implementation. Conversely, a comprehensive training program with easy access throughout the Commonwealth can do much to mitigate the other practical impediments that have been previously discussed. Training can play a significant role in gaining vendor buy-in and help to ease concerns over Ec/EP standardization and security concerns.

- *Year 2000.* The efforts currently underway to fix year 2000 (Y2K) problems throughout the Commonwealth will, of necessity, take priority over any other IT projects. Y2K work during 1999 may be an impediment to Ec/EP implementation

VI. ELECTRONIC CONTRACTING AND PROCUREMENT AND THE VIRGINIA PUBLIC PROCUREMENT ACT

One of the critical concerns voiced in Senate Joint Resolution (SJR) Number 36 is the effect that technological advancement will have on the Virginia Public Procurement Act (VPPA). As discussed in SJR 36, the VPPA was first enacted by the 1982 Session of the General Assembly and has been the subject of several studies since its enactment. During each session of the General Assembly, several bills are normally introduced to amend the VPPA in some

way. Despite the studies and bills, procurement methods in the Commonwealth have not changed significantly since the VPPA first became law. The authors of SJR 36 recognize that significant technological advancements, which could greatly facilitate electronic contracting and procurement (Ec/EP) throughout the Commonwealth, have occurred in recent years. How can the essential purposes and protections of the VPPA be safeguarded while still taking advantage of the advances in technology that make Ec/EP an increasing reality in the world of commerce?

The Purposes and Relevant Protections of the Act

The general purpose of the VPPA is to enunciate the public policies pertaining to governmental procurement from nongovernmental sources. In addition to a general statement of purpose, the VPPA also establishes the intent of the General Assembly with regard to government procurement. This documentation of intent can be found in Article 1, Section 11-35 (G) of the VPPA:

> "To the end that public bodies in the Commonwealth obtain high quality goods and services at reasonable cost, that all procurement procedures be conducted in a fair and impartial manner with avoidance of any impropriety or appearance of impropriety, that all qualified vendors have access to public business and that no offeror be arbitrarily or capriciously excluded, it is the intent of the General Assembly that competition be sought to the maximum feasible degree, that individual public bodies enjoy broad flexibility in fashioning details of such competition, that the rules governing contract awards be made clear in advance of the competition, that specifications reflect the procurement needs of the purchasing body rather than being drawn to favor a particular vendor, and that the purchaser and vendor freely exchange information concerning what is sought to be procured and what is offered."

The VPPA implements this broadly stated intent of the General Assembly by prescribing specific procurement methods, standards and procedures. It provides detailed guidance regarding contract formation and administration, the prohibition of discrimination, the encouragement of participation by small businesses and those owned by women and minorities, prompt payment procedures, the specification of remedies and ethical standards, and procedures for determining vendor eligibility, to name just a few.

Establishing Safeguards

In order to establish appropriate safeguards, which maintain the purposes and protections of the VPPA, Ec/EP implementation planning must address both the information technology (IT) or technical and the business process or functional aspects of doing procurement electronically. In other words, VPPA safeguards

will be effective to the extent that complete technical and functional implementation and integration of a statewide Ec/EP system is accomplished.

Accepting the definition of Ec/EP as a form of contracting and procurement that occurs within an electronic system does not imply that the purposes and protections of the VPPA must be abandoned. Through the judicious application of technology, using powerful enterprise software and the appropriate reengineering of business processes, the broad principles of the VPPA can be accommodated and enforced. As an example, small purchasing systems in operation today will automatically compete bid opportunities among potential bidders or offerors in a vendor database and make awards to responsible and responsive companies based on programmed evaluation and selection criteria. This same software can be utilized to insure that a minimum number of minority or women owned businesses are automatically included in the electronic list of bidders. In this example, and in many other cases, Ec/EP software can actually be used to more objectively implement guidance contained in the VPPA.

To the extent that available Ec/EP application software and related IT cannot answer the requirements of the VPPA, then functional processes can be established or reengineered to accommodate these shortcomings. As an example, in the procurement of professional services, certain aspects of the negotiation process could, of necessity, remain outside of any electronic system. The successful implementation of Ec/EP does not require that 100% of all contracting and procurement activity must be carried out electronically.

Outside of a limited number of potential legal impediments and questions of interpretation, which were discussed in Section V. of this report and which require legislative action or judicial interpretation, the essential purposes and protections of the VPPA can be safeguarded when implementing Ec/EP. A Commonwealth of Virginia Ec/EP plan, that begins with sound procurement business processes, focuses first on small purchases, and is supported by proven or demonstrated procurement system technology, can generally be implemented under the current VPPA. However, amendments to the VPPA, that remove uncertainty and clarify questions of interpretation, would better facilitate implementation in the Commonwealth and allow state organizations to take full advantage of the efficiencies provided by Ec/EP.

VII. DEMONSTRATION PROJECTS

Implementation of electronic commerce (EC), to include electronic contracting and procurement (Ec/EP), has already begun in the Commonwealth. Virginia's implementation of EC, while generally small in scope, is as varied as the many organizations that make up the Commonwealth. In most cases, agencies, counties, cities and other instrumentality's have begun implementation of EC on their own initiative, using their own approach. An important Study Team

consensus is that statewide demonstration projects should be used to promote future expanded use of Ec/EP.

The Objective of Demonstration Projects

By utilizing statewide demonstration projects, a number of significant objectives can be achieved. These objectives include:

- Demonstrate functional and technical feasibility of major components of Ec/EP for use throughout the Commonwealth. As an example, participants would evaluate selected Ec/EP application software and hardware together with the integration of those products into their everyday operations. The identification of best products and practices through demonstration would support a more effective an efficient expansion of Ec/EP.

- Identify significant costs associated with Ec/EP implementation to support further cost/benefit analysis. As an example, by utilizing diverse organizations, such things as minimum start-up and relative scale-up costs can be better established.

- Validate event timing prior to establishment of a statewide implementation schedule. The complete implementation and integration of Ec/EP within a few selected organizations would give a clearer picture of the total time needed to implement the expanded use of Ec/EP throughout the Commonwealth.

- Establish a basic Ec/EP infrastructure to facilitate future expansion. There are certain key components of Ec/EP that must be in place regardless of the expected size or complexity of the final electronic system. As an example, establishing a central procurement Web site with a central vendor registration capability would significantly enhance and facilitate any Web based Ec/EP effort by the Commonwealth.

- Educate and gain user acceptance for Ec/EP. All members of the Study Team emphasized the need to make education and training available early in the implementation process. Making education and training available through demonstration projects would promote a more rapid user acceptance and expansion of Ec/EP.

- Identify further issues. Implementation of Ec/EP is still in its infancy in the public sector. While it is possible to gain knowledge from analyzing the implementation of Ec/EP by other states, that knowledge base is not comprehensive. The use of demonstration projects allows the Commonwealth to expand upon that knowledge base and proceed with measured implementation that takes advantage of lessons learned from the demonstrations.

Project Participation and Management

It will be critical to build demonstration teams that are representative of the diversity found in potential Commonwealth Ec/EP users. Participants should be selected from a pool of volunteer organizations to meet the following target mix:

- Large or complex versus small or less complex state agencies.
- Urban or suburban versus rural counties.
- Large versus small municipalities.
- Highly developed (information technology (IT) infrastructure) versus less developed regions.
- Large, small, minority and women owned vendors.

Because of their respective responsibilities with regard to implementation of the Virginia Public Procurement Act (VPPA) and statewide strategic IT planning, the Department of General Services (DGS) together with the Council on Information Management (CIM) should select representative demonstration team participants and manage the overall demonstration effort.

Recommended Projects

The number and scope of demonstration projects should be established by DGS and CIM to adequately achieve the demonstration objectives using a representative mix of participating organizations. In order to begin to establish a statewide infrastructure that will facilitate the future expansion of Ec/EP throughout the Commonwealth, the following critical or core projects are highly recommended:

- *Procurement Web Site Demonstration.* DGS would take the lead in establishing a central procurement Web site for the Commonwealth. Both centralized vendor registration and centralized statewide ordering would be demonstrated.
- *Web Site Bid Advertising Demonstration.* Virginia Polytechnic and State University (VPISU) would take the lead, working with DGS, the Virginia Electronic Commerce Technology Center (VECTEC), and other participants, to demonstrate the feasibility of Web based bid advertising.
- *Current Enterprise Software Integration.* The Virginia Department of Transportation (VDOT) would take the lead, working with other interested participants, in demonstrating the integration of their fully established

business enterprise system with the Commonwealth central procurement Web site.

The organizations named in these core projects have already volunteered their involvement as either a lead or participating member of each demonstration. It is not anticipated that the number of demonstrations would exceed a total of six, including the three recommended core projects. DGS and CIM would report the status of all demonstration projects to the Governor and the General Assembly of Virginia upon completion but not later than the next session of the General Assembly.

Funding

The general intent is that demonstration projects will be funded out of current operating budgets; however, the need to insure diverse participation by representative organizations from across the Commonwealth necessitates that some contingency funding be available. Not all of the organizations that should participate in the demonstrations have equal access to the resources needed for required up-front investments. This funding would be used for project start-up costs where available IT resources are not adequate. Funding, in the amount of a $300,000 special appropriation, should be earmarked in an amended DGS operating budget to support Ec/EP demonstration projects.

VIII. POTENTIAL IMPLEMENTATION COSTS ASSOCIATED WITH ELECTRONIC CONTRACTING AND PROCUREMENT

Senate Joint Resolution (SJR) Number 36 requires the identification of any costs associated with the implementation of electronic contracting and procurement (Ec/EP) by the Commonwealth and its political subdivisions. In Section VII of this report, the potential costs associated with recommended 1999 Ec/EP demonstration projects along with a suggested funding level were presented. Because the costs (and benefits) attributed to Ec/EP can vary widely from organization to organization, and because costs are highly dependent upon the degree to which Ec/EP technology is integrated into a re-engineered procurement workflow, pilot or demonstration projects provide an excellent method to identify and validate implementation costs. One of the most important objectives of any Commonwealth demonstration project would be to identify significant costs that may be incurred with expanded Ec/EP implementation in the years 2000 and beyond. Costs identified during the demonstration projects would be based on a pre-approved cost model that would support a cost/benefit analysis of any future expansion plans. The results of this cost analysis effort, including funding recommendations, would be presented to the 2000 session of the General Assembly. See Section IX of this report for further information regarding related implementation actions in 1999. This section of the report

describes the general categories of costs associated with Ec/EP implementation that should be the subject of analysis during planned demonstration projects.

- *System Modifications*

The implementation of Ec/EP may require system modifications. Depending on the selected implementation strategy, modifications can have an effect on both system hardware and software. The cost of modifications will vary depending on the current information technology (IT) infrastructure and procurement system architecture of each participating organization. A simple case may require the establishment or redirection of a file link, while a more complex situation may require a complete data base redesign. System modifications also depend on the degree to which participating organizations want to integrate their existing business processes into the new Ec/EP system. The anticipated strategy for initial statewide Ec/EP demonstration projects, which focus on the establishment of a central procurement World Wide Web (Web) site for the Commonwealth, should attempt to minimize costs associated with system modifications. As an example, emphasis would be placed on a Commonwealth Ec/EP architecture that takes maximum advantage of existing hardware and procurement software while simultaneously relying on the central Web site to support access to unique system processes.

- *Standardization and Implementation Conventions*

The implementation of Ec/EP by the Commonwealth should present a "single face to customers." No matter what state organization or vendor you are dealing with, the system processes and procedures should look identical. Such uniformity may require the establishment or adoption of Ec/EP standards and implementation conventions. As with system modifications, the costs associated with standardization will vary depending on the current IT infrastructure and procurement system architecture of each participating organization. Initial statewide Ec/EP demonstration projects should attempt to minimize the costs associated with standardization; however, some basic standards and conventions (e.g. uniform commodity coding) will probably be required.

One possible strategy to keep standardization costs to a minimum would be to adopt existing industry standards and conventions such as those established by the National Institute of Government Purchasing, Incorporated (NIGP). As an example, NIGP commodity identification codes are commonly used in many procurement systems throughout the United States. Because of the rapid expansion of Web-based commerce, many new organizations are getting involved in standardization efforts. In 1997, for example, the Internet Purchasing Roundtable and American Express, a group of Fortune 500 companies and their suppliers, created a set of implementation conventions known as "Open Buying on the Internet (OBI)." OBI specifies the processes, formats, security, and technical design for the buying and selling of commodities over the Web. It is

based on commonly used Web protocols and it is free to all users. "OBI...enforces uniformity on data transactions, but it's flexible on the appearance of the user interface for electronic catalogs," said the director of Massachusetts' Operational Services Division. OBI has been adopted for use in a multi-state electronic mall pilot project for purchasing called "EMall." The states involved in this are Massachusetts, Idaho, New York, South Dakota, Texas, Utah, and Washington. In the long-run, states in the EMall pilot look to expand beyond just a catalog-based small purchasing system to a full-service procurement system.[14]

- *Electronic Commerce Gateway Acquisition and Infrastructure Improvements*

In order to participate in any Web-based Ec/EP system, organizations must have access to an electronic commerce (EC) gateway. These gateways provide basic communications, security and related services to their customers. Organizations must also have an adequate IT infrastructure, both hardware and software, to enter the EC gateway. Virginia benefits from a robust EC infrastructure that is rapidly expanding throughout the state. Generally speaking, organizations that will participate in a Commonwealth Ec/EP system already have established EC gateways. For those state organizations not yet involved in Web-based business activities, some costs may be incurred for EC gateway acquisition and infrastructure improvements.

- *Public Access*

The implementation of a Web-based Ec/EP system that insures fair access to the public business of the Commonwealth cannot depend exclusively on the private funding of EC gateway acquisition and infrastructure. Some form of public access should be made available to insure all qualified vendors have the opportunity to compete for state business. This public access could take the form of computer kiosks in state agency branch offices, in public and university libraries, and in selected county and city offices across the Commonwealth. These kiosks or computer centers would offer Ec/EP system customers, primarily vendors, the EC gateway and infrastructure they need to access all system processes along with supporting on-line training. The cost of establishing or expanding access to Ec/EP can be minimized by taking advantage of existing public access computer kiosks or centers such as those planned for publicly funded libraries.

- *Training and Education*

The successful implementation of a statewide Ec/EP system will depend, to a great extent, on the simultaneous implementation of a comprehensive Ec/EP training and education program. Emphasis should be placed on "exportable"

[14] T. Newcombe, "Multi-state Online Procurement Project Under Way," Government Internet Guide, October, 1998, Supplement.

training that is readily available to users of the system as part of a central procurement Web site. Additional education efforts should include a public awareness campaign for potential vendors to provide them advance knowledge of the new Ec/EP system. Vendors could be reached through a campaign involving various forms of print and electronic media. Organizations like the Virginia Electronic Commerce Technology Center (VECTEC) could also be utilized as sources of more formal classroom training. Because training and education must be in place at the beginning of any implementation, the majority of the costs associated with training and education development will be incurred and funded as part of planned Ec/EP demonstration projects.

- *Vendor Related Costs*

Most of the costs associated with Ec/EP implementation apply equally to both public organizations and private vendors. As with public organizations, the degree to which vendors will incur Ec/EP related implementation costs will depend, to a great extent, on their current IT infrastructure and procurement system architecture. Vendors who choose not to establish or upgrade their IT infrastructure and business systems in order to participate in a statewide Ec/EP program, will have the option to utilize publicly available access sites. Most vendors, however, will choose to incur modest additional costs to integrate their business processes and systems into a Commonwealth system.

Examples of potential costs that are unique to vendors are those costs associated with Ec/EP system registration and the development and maintenance of catalogs and pricing data. These costs can be minimized by the establishment of a simple, effective, one-stop vendor registration process that can be accessed through a Commonwealth central procurement Web site. The federal and state governments that have begun to successfully implement Ec/EP systems have stressed the importance of one-stop vendor registration. The federal government is using such a vehicle called the Central Contractor Registration System (CCRS) which allows vendors to simultaneously register and provide their product (commodities and services) information. A similar system at the state level would reduce potential vendor costs and facilitate vendor "buy-in" to a Commonwealth Ec/EP system.

IX. IMPLEMENTATION TIMETABLE

There are several considerations that will influence the overall implementation timetable of electronic contracting and procurement (Ec/EP) by state organizations. First, aspects of Ec/EP are already being implemented by selected Commonwealth of Virginia (COV) organizations such as the Virginia Department of Transportation (VDOT). A strong foundation for a statewide implementation schedule could be established by taking advantage of the Ec/EP work already underway. Second, research indicates that most states are only

beginning to automate their contracting and procurement functions through prototype systems or pilot projects. This cautious approach is partly driven by the mixed success that electronic commerce (EC) has had in the private sector. Companies like Amazon.com have yet to show a profit from large investments in their EC based business. Cautious implementation schedules, in such states as Massachusetts, Wisconsin and Florida, are also being driven by limited anecdotal feedback from Ec/EP initiatives in the public sector. The Massachusetts-led multi-state EMall project, as an example, is a pilot project that is aimed at testing customer and vendor participation in a "commodity limited" purchasing system. A third important consideration is that all state organizations must give priority to fixing their remaining year 2000 (Y2K) problems during the coming calendar year, 1999. The time and resources expended on Y2K work could have a significant impact on any Ec/EP implementation timetable.

With these considerations in mind, there is general agreement among Senate Joint Resolution (SJR) Number 36 Study Team participants that the logical next step for Virginia is to demonstrate statewide Ec/EP capabilities. Demonstration projects (described in Section VII. of this report) could commence in 1999. The scope and effectiveness of these projects could be maximized if the legal and other potential impediments identified in this report are removed. Successful demonstration projects, taking advantage of the work already underway in some state agencies, could then be used as a strong foundation for the further expansion of Ec/EP throughout the Commonwealth in 2000. Implementation of the recommendations (numbers 2-12) contained in Section X. of this report could begin in 1999 as part of, or in conjunction with, the commencement of demonstration projects. A status report on ongoing demonstration projects, including the results of specific work on each recommendation, would then be presented to the 2000 session of the General Assembly. That report would also include further recommendations and an implementation schedule for the years 2000 and beyond.

X. CONCLUSIONS AND RECOMMENDATIONS

In the introduction to this report, a theme or overarching framework for the study of electronic contracting and procurement (Ec/EP) was introduced. This framework was developed during Phase I of the study effort from preliminary research, individual discussions with Senate Joint Resolution (SJR) Number 36 Study Team participants, and the drafting of a detailed report outline which was approved by the Study Team at a meeting on September 23, 1998. The following two general conclusions are derived from the study framework, supported by the documented findings of the report, and provide a foundation for understanding subsequent recommendations:

- Recommendations should be broadly permissive in their intent and actively promote the expanded use of Ec/EP throughout the Commonwealth of Virginia (COV).

- Because of the diversity of state organizations, recommendations that mandate Ec/EP through legislative or regulatory changes would not necessarily achieve the most beneficial or cost effective results.

Conclusion: Virginia Code, Section 2.1-7.4, expressly excludes state agencies from accepting the electronic filing of any information required or permitted to be filed pursuant to the Virginia Public Procurement Act (VPPA). While this section of the Virginia Code does not preclude every effort to automate procurement, it stands as a significant impediment to the implementation of Ec/EP within the Commonwealth.

Recommendation No. 1: Eliminate the impediment to Ec/EP contained in Virginia Code, Section 2.1-7.4.

Conclusion: Selected COV organizations have already begun to implement some aspects of Ec/EP. Research indicates that most states are only beginning to automate their contracting and procurement functions through the establishment of prototype systems or pilot projects. This prototype or "go slow" approach is born out by mixed success with electronic commerce (EC) efforts in the private sector, limited anecdotal feedback from EC initiatives in the public sector, and the potential impact in 1999 of the statewide year 2000 project. There is general agreement among Study Team participants that the logical next step for Virginia is to demonstrate statewide Ec/EP capabilities. Successful demonstration projects, taking advantage of the work already underway in some state agencies, could then be used as a strong foundation for the expansion of Ec/EP throughout the Commonwealth.

Recommendation No. 2: Establish and fund demonstration projects to confirm functional and technical feasibility, better define cost-benefit relationships, validate implementation schedules, establish an Ec/EP infrastructure, educate and gain user acceptance, and identify further issues.

Conclusion: The technology exists to conduct Ec/EP over the Internet. Multiple, nonstandard, procurement Web sites, as now exist throughout state government, will hinder the effective implementation of any statewide system. Conversely, a single COV procurement Web site clearly establishes an excellent cornerstone for future Ec/EP development and expansion.

Recommendation No. 3: Establish a single COV procurement Web site, accessible through VIPNet or other Internet service provider, with appropriate links (to other COV sites) and search capability.

Conclusion: The federal government and the state governments that have begun to successfully implement Ec/EP systems have stressed the importance of simple, effective, one-stop vendor registration. Experience indicates that companies will "buy-in" to public procurement systems when access is simple and they are not forced to significantly reengineer their business processes in order to compete.

Recommendation No. 4: Implement standard, one-stop vendor registration through the COV procurement Web site.

Conclusion: At both the federal and state levels of government, small purchases are generally the most frequent and, given their repetitive nature, easily automated transactions. Because of the large volume of small purchases being made throughout the Commonwealth on a daily basis, an Ec/EP system that gives priority to automating small purchase procedures and eliminating paper based processes (with frequent human intervention) will potentially generate the most significant resource savings.

Recommendation No. 5: Promote the expanded use of Ec/EP (through a central COV procurement Web site) for the purchasing of goods up to the VPPA small purchase limit of $30,000.

Conclusion: Current software technology can generally support the integration of different Ec/EP systems operating through a central procurement Web site. During the integration process, required data base mapping is greatly facilitated by some minimal level of data element standardization. As an example, ordering a specific office supply item from a listing of different vendor catalogs is significantly easier if both the purchaser and suppliers agree on how that item will be coded in the catalog data base. Too much standardization, however, can become an impediment to the broad acceptance of Ec/EP in the Commonwealth. Statewide implementation efforts should focus on establishing a "minimum" level of standardization necessary to effectively conduct Ec/EP.

Recommendation No. 6: Adopt minimum data element standardization (e.g., vendor code, commodity code) to insure effective Web-based Ec/EP across state organizations and with vendors.

Conclusion: Various Study Team participants have voiced concern over the question of vendor access to a statewide electronic contracting and procurement system. To answer these concerns and to safeguard the VPPA, it is essential that adequate vendor accessible computer sites be made available throughout the Commonwealth. The location and composition of these sites should be part of any Ec/EP implementation plan.

Recommendation No. 7: Establish sufficient vendor accessible computer sites across the state to assure that Ec/EP is conducted in a fair and impartial manner and that all qualified vendors have access to public business.

Conclusion: P-cards represent the most basic form of Ec/EP and have the potential to significantly reduce the costs of non-critical, small-volume purchasing for organizations throughout the state. The majority of state agencies are presently using P-cards; however, few take full advantage of the $5,000 purchasing limit. Expanded use of P-cards, in conjunction with a COV procurement Web site, is a simple and effective way to increase Ec/EP within the Commonwealth.

Recommendation No. 8: Promote the expanded use of P-cards for purchases up to $5,000.

Conclusion: One of the major challenges to successful implementation of Ec/EP is training and education. An effective implementation program must include training for state employees using the new Ec/EP systems and also training and educational outreach programs for the vendor community. A well executed training and education program can play a significant role in gaining user acceptance and facilitating the implementation of a new Commonwealth Ec/EP system.

Recommendation No. 9: Promote Ec/EP through training and educational programs across the state.

Conclusion: Organizations throughout the Commonwealth are engaged in various aspects of electronic commerce and Ec/EP. Based on discussions with selected private and public sector organizations and a preliminary survey of COV counties and cities, a general understanding of statewide Ec/EP progress has been established. However, the anecdotal information obtained to date is not adequate to support a comprehensive plan for efficient statewide implementation of Ec/EP.

Recommendation No. 10: Conduct a comprehensive survey of current Commonwealth Ec/EP programs to establish a realistic baseline for further implementation initiatives.

Conclusion: The consensus of the Study Team is that a Web based system, utilizing an electronic data interchange (EDI) or non-EDI approach, would best facilitate the implementation and future expansion of Ec/EP in the Commonwealth. The state has already made an investment in EDI software, which has been used for several years by the Department of Accounts to process and pay invoices. That same software could support additional EC initiatives to include Ec/EP.

Recommendation No. 11: Evaluate possible increased utilization of available EDI software to support Ec/EP expansion across state organizations.

Conclusion: Some of the efficiencies of Ec/EP can be realized within the confines of the current VPPA. However, implementation of certain procurement activities does face potential legal impediments that raise questions of interpretation for the Commonwealth's administrators, tribunals and courts. Therefore, the current VPPA does not take full advantage of all possible efficiencies associated with Ec/EP.

Recommendation No. 12: Request that the COV Procurement Assessment Task Force, established by Executive Order 30 (98), consider recommended changes to VPPA that would allow state organizations to take better advantage of the efficiencies provided by Ec/EP.

APPENDIX A

SENATE JOINT RESOLUTION NO. 36

Requesting the Council on Information Management and certain other agencies and organizations to study jointly study methods of electronic contracting and procurement under the Virginia Public Procurement Act (§ 11-35 et seq.).

Agreed to by the Senate, February 26, 1998

Agreed to by the House of Delegates, February 24, 1998

WHEREAS, the federal government has set a goal of "paperless" contracts with its suppliers and contractors by the year 2000; and

WHEREAS, large national companies such as Wal-Mart are requiring their suppliers and contractors to transact business with them through electronic means, such as the global information system known as the "Internet"; and

WHEREAS, estimates indicate that by the year 2000, $180 billion in electronic transactions will occur worldwide; and

WHEREAS, the advent of numerous and significant technological advancements which facilitate electronic contracting and procurement could result in reshaping government's operations, creating efficiencies, reducing transaction costs, and avoiding duplication; and

WHEREAS, the Virginia Public Procurement Act (VPPA) (§11-35 et seq.) was first enacted by the 1982 Session of the General Assembly; and

WHEREAS, the VPPA has been the subject of several studies since its enactment; and

WHEREAS, each session, several bills are introduced which attempt to amend the VPPA or some part of Virginia's public procurement process in some way; and

WHEREAS, despite the studies which have been undertaken and the bills which have been considered, the methods by which the Commonwealth and its political subdivisions procure goods and services have not changed much, even with the advent of numerous and significant technological advancements which could facilitate electronic contracting and procurement; and

WHEREAS, such technological advancements and their effects on the VPPA have not been previously studied; now, therefore, be it

RESOLVED by the Senate, the House of Delegates concurring, That the Council on Information Management, the Departments of Accounts, General Services, Motor Vehicles, and Transportation, the State Corporation Commission, the Office of the Attorney General, the University of Virginia, the Virginia Polytechnic Institute and State University, the Virginia Association of Counties, and the Virginia Municipal League be requested to study jointly study methods of electronic contracting and procurement under the Virginia Public Procurement Act (§11-35 et seq.). At a minimum, the study shall (i) suggest definitions of appropriate terms such as "electronic contracting" and "electronic procurement"; (ii) identify technological advancements which facilitate electronic contracting and procurement, including, but not limited to, use of a mandatory procurement card ("P-card") for small purchases, Internet purchasing, electronic catalogue

systems, electronic bid systems, and Web site development; (iii) determine legal impediments in the Commonwealth's laws or regulations which restrict or prohibit electronic contracting and procurement; (iv) establish appropriate safeguards which maintain the purposes and protections of the VPPA through electronic contracting and procurement; (v) determine practical and other impediments which restrict or prohibit electronic contracting and procurement by the Commonwealth and its political subdivisions; (vi) identify any costs associated with implementation of electronic contracting and procurement by the Commonwealth and its political subdivisions; and (vii) determine a reasonable timetable for implementation of electronic contracting and procurement by the Commonwealth and its political subdivisions.

Staff shall be provided to the study by the Council on Information Management. The Council on Information Management shall encourage and solicit the participation of any interested parties or individuals, including but not limited to Newport News Shipbuilding and the Virginia Electronic Commerce Technology Center at Christopher Newport University. All agencies of the Commonwealth shall provide assistance for the study, upon request.

The Council on Information Management shall report on the status of the study to the Joint Commission on Technology and Science and the Co-Chairmen of the House Committee on Science and Technology on or before October 15, 1998, and shall complete their work in time to submit their findings and recommendations to the Governor and the 1999 Session of the General Assembly as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents.

APPENDIX B

Glossary

ANSI ASC X12: A committee that develops and maintains U.S. standards for EDI.

Business Application: Software supporting a specific business function; in EDI, data is produced by such systems and, where necessary, translated into the ANSI X12 Format.

Contract: (1) A deliberate oral or written agreement between two or more competent persons to perform or not to perform a specific act or acts. (2) All types of (government) agreements, regardless of what they may be called, for the procurement or disposal of supplies, services, or construction. (3) The total legal obligation that results from the parties' agreement as affected by the Uniform Commercial Code (UCC) and any other applicable law.

Client: A personal computer (PC) or workstation on which users run applications.

Data Element: The smallest, meaningful piece of information in a business transaction; sometimes a method of condensing longer information into a shorter code.

Data Element Dictionary: A publication listing all data elements used with EDI structures.

Data Mapping & Modeling: The process by which data is diagrammed and structured for use in business applications and to meet EC/EDI standards.

Digital Signature: A code or signal that equates to a hand-written signature.

Electronic Commerce (EC): The paperless exchange of business information using EDI, E-mail, electronic funds transfer or other similar network-based business applications. EC is the overarching business strategy by which the government and or private sector expect to make significant reductions in business costs during the next decade.

Electronic Contracting (Ec): The formation and performance of a contract that occurs within an electronic system.

Electronic Data Interchange (EDI): The computer-to-computer exchange of business data in a standardized format between Trading Partners. EDI is also used to refer to a broad set of standards such as ANSI ASC X12 governing EC.

Electronic Funds Transfer (EFT): The exchange of payment and remittance information electronically.

Electronic Procurement (EP): The conduct of procurement activities within an electronic system.

Electronic Purchasing: The conduct of a purchasing transaction within an electronic system.

Electronic Signature: Any electronic identifier intended by the person making, executing, or adopting it to authenticate and validate a record.

Encryption: The transformation of normal plain text that is to be maintained as confidential into a cipher text using a set of rules.

Interface: A recognizable and definable crossover point between two systems.

Procurement: The procedures for obtaining goods or services, including activities from the planning steps and preparation and processing of a requisition, through receipt and acceptance of delivery and processing of a final invoice for payment. The acts of preparing specifications, evaluating bids or proposals, making awards, and administering contracts are involved.

Purchase Description: The words used in a solicitation to describe the supplies, services, or construction to be purchased, and includes specifications, attached to, or made part of the solicitation.

Purchase Order: A purchaser's document to formalize a purchase transaction with a vendor. The purchase order should contain statements as to the quantity, description, and price of the goods and/or services ordered; applicable terms as to payment, discounts, date of performance and transportation; and other factors or suitable references pertinent to the purchase and its execution by the vendor. Acceptance of a purchase order constitutes a contract.

Purchase Request: Information transmitted by a using agency requesting the central procurement office to effect a contract for a particular need or group of needs. The request may include but is not limited to a performance or technical description of the requested item, delivery schedule, transportation mode, criteria for evaluation, suggested source of supply, and information related to the making of any written determination required by policy or procedure.

Real-Time EDI: EDI in which transaction sets are sent and received online and completed in a single session. Presently most EDI is done in the store-and-forward/retrieve mode.

Security: The desired level of integrity, exclusiveness, availability and/or effectiveness to protect data from loss, corruption, destruction and/or unauthorized used.

Server: A powerful computer or processor dedicated to managing disk drives (file server), printers (print server), or network traffic (network server).

Standard Generalized Markup Language: A standard enabling the electronic exchange of documents between dissimilar systems. Hyper Text Markup Language (HTML) is an example of an SGML-based standard used for creating Web pages that incorporate hypertext links, text, graphics, and multimedia.

Store-and-Forward: The process of storing EDI transmissions in an electronic mailbox before delivering to recipients.

Transaction Set: An EDI document composed of a group of segments and data elements, all comprising a standard business document.

Translation Software: System for translating an incoming ASC X12 transaction set into an ASCII flat file or visa versa. Sometimes called EDI management systems.

Value-Added Network (VAN): Generally commercial entities that transmit, receive and store EDI transactions on behalf of customers; 57,000 VANs operate today, many performing additional business services; VANs are sometimes called third party networks.