LEGISLATIVE RESEARCH COMMISSION

PROGRAM REVIEW AND INVESTIGATIONS COMMITTEE

Information Technology In Kentucky State Government

Research Report No. 445

Prepared by

Van Knowles, Jean Ann Myatt, Shane Stevens, and Joel Thomas

Kentucky Legislative Research Commission

Robert Stivers **President, LRC Co-Chair**	Gregory D. Stumbo **Speaker, LRC Co-Chair**
SENATE	**HOUSE**
Katie Kratz Stine **President Pro Tem**	Larry Clark **Speaker Pro Tem**
Damon Thayer **Majority Floor Leader**	Rocky Adkins **Majority Floor Leader**
R. J. Palmer II **Minority Floor Leader**	Jeff Hoover **Minority Floor Leader**
Dan Seum **Majority Caucus Chair**	Sannie Overly **Majority Caucus Chair**
Johnny Ray Turner **Minority Caucus Chair**	Bob DeWeese **Minority Caucus Chair**
Brandon Smith **Majority Whip**	Tommy Thompson **Majority Whip**
Jerry P. Rhoads **Minority Whip**	John "Bam" Carney **Minority Whip**

Marcia Ford Seiler, Acting Director

The Kentucky Legislative Research Commission is a 16-member committee comprised of the majority and minority leadership of the Kentucky Senate and House of Representatives. Under Chapter 7 of the Kentucky Revised Statutes, the Commission constitutes the administrative office for the Kentucky General Assembly. Its director serves as chief administrative officer of the legislature when it is not in session. The Commission and its staff, by law and by practice, perform numerous fact-finding and service functions for members of the General Assembly. The Commission provides professional, clerical, and other employees required by legislators when the General Assembly is in session and during the interim period between sessions. These employees, in turn, assist committees and individual members in preparing legislation. Other services include conducting studies and investigations, organizing and staffing committee meetings and public hearings, maintaining official legislative records and other reference materials, furnishing information about the legislature to the public, compiling and publishing administrative regulations, administering a legislative intern program, conducting a presession orientation conference for legislators, and publishing a daily index of legislative activity during sessions of the General Assembly.

The Commission also is responsible for statute revision; publication and distribution of the *Acts* and *Journals* following sessions of the General Assembly; and maintenance of furnishings, equipment, and supplies for the legislature.

The Commission functions as Kentucky's Commission on Interstate Cooperation in carrying out the program of the Council of State Governments as it relates to Kentucky.

Information Technology
In Kentucky State Government

Program Review and Investigations Committee

Sen. Christian McDaniel, Co-chair
Rep. Martha Jane King, Co-chair

Sen. Tom Buford
Sen. Perry B. Clark
Sen. Ernie Harris
Sen. Jimmy Higdon
Sen. Dorsey Ridley
Sen. Dan "Malano" Seum
Sen. Whitney Westerfield

Rep. Leslie Combs
Rep. Jim DeCesare
Rep. David Meade
Rep. Terry Mills
Rep. Ruth Ann Palumbo
Rep. Rick Rand
Rep. Arnold Simpson

Project Staff

Van Knowles
Jean Ann Myatt
Shane Stevens
Joel Thomas

Greg Hager, PhD
Committee Staff Administrator

Research Report No. 445

Legislative Research Commission
Frankfort, Kentucky
lrc.ky.gov

Adopted November 13, 2014

Paid for with state funds. Available in alternative format by request.

Abstract

Information technology assets consist of infrastructure, enterprise applications, and business applications. IT assets in the state vary in their complexity, performance, purpose, and age. Consolidation of IT infrastructure and support within the Commonwealth Office of Technology is under way, though there were some concerns. Generally, agencies reported that IT assets were better than average. Some major business applications are more than 20 years old and are written in languages that limit their compatibility with more modern systems. Replacing such systems costs millions of dollars and takes several years. Funding, procurement, project management, staffing, security, and accounting issues were noted. There is little information to assess progress in improving technology, but data from this study can serve as a baseline for future comparison. The report makes eight recommendations.

Foreword

Program Review staff thank the officials and staff of the Finance and Administration Cabinet and Commonwealth Office of Technology for their extensive cooperation in this study. Staff also wish to acknowledge the assistance of staff of the Cabinet for Health and Family Services, Transportation Cabinet, and Personnel Cabinet for specific business application expertise and feedback. Program Review staff thank officials and staff of the Auditor of Public Accounts and Administrative Office of the Courts for providing information for the study. Numerous state agencies contributed valuable information to the study through focus groups, individual questions, and surveys.

At the Legislative Research Commission, Program Review staff thank Jon Roenker, Legislative Economic Analysis; Jennifer Anglin, Budget Review; Shawn Bowen, Josh Nacey, and Katherine Halloran, Capital Planning Advisory Board and Capital Projects and Bond Oversight; and Hanley Loller, Office for Computing and Information Technology.

Program Review staff thank Doug Robinson, executive director for the National Association of State Chief Information Officers, and Richard Greene, consultant to the Pew Charitable Trusts Government Performance Unit, for providing input to the study.

Marcia Ford Seiler
Director

Legislative Research Commission
Frankfort, Kentucky
November 2014

Contents

Tables

Figures

Summary

Technology is not as visible to the public or to policy makers as are personnel and physical infrastructure like buildings and highways, but it has similar importance to the functioning of the state, and it is changing and growing at a rapid pace. There is little information to assess the state's progress in improving technology, but the data from this study can serve as a baseline for future comparison.

Information technology (IT) infrastructure consists of computers, operating systems and productivity or utility software, servers, networking hardware, phone systems, and other IT assets. These are the tools that state employees use to interact with the business applications that many people think of as "IT" and the building blocks of those applications.

Business applications are complex systems of software and equipment that agencies depend on to perform many of their daily business activities. Examples are the statewide accounting system and the automated vehicle information system. Major business applications often cost millions of dollars to build or purchase and sometimes cost millions of dollars per year to operate.

Overall, state agencies rated their IT assets as better than average but not excellent. In some cases, technologies that are perceived as inappropriate or out of date are not; such misunderstandings could be reduced by improved communication and training. In fact, some older business applications still work well but suffer from lack of support, inflexible programming, user interfaces that are difficult for younger workers to use, and inefficient operation. Replacing such applications would make state staff more productive and free up resources for other purposes. Agencies also reported numerous instances of major IT applications that were difficult to use, some in imminent need of replacement.

Several of those applications are large enough that they have been called "mega projects" costing many millions of dollars. Where large IT applications are inappropriate or out of date, agencies often have submitted multiple requests for replacement that have gone unfunded, and where smaller IT needs have gone unmet, such as obsolete equipment, it has usually been due to budget limitations. Despite annual operating and capital expenditures of more than $200 million, some IT needs remain outstanding. Agencies rated funding needs as the greatest challenge to improving technology.

The Commonwealth Office of Technology (COT) has primary responsibility for overseeing executive branch technology. The executive branch is undertaking a technology infrastructure consolidation; all infrastructure assets, along with all related support personnel, are being placed under direct COT management. All new infrastructure purchases must be made through COT, and only COT may hire infrastructure support staff. Agencies pay COT a monthly fee for the cost of equipment, software, and support services. All IT personnel actions require approval by the Finance and Administration Cabinet. According to a 2012 consultant's report, when completed the consolidation might save more than $16.7 million annually.

COT has begun to intercede with agencies' plans for business applications, attempting to ensure standard development methods, to share common solutions among agencies, and to improve access to data among agencies. These efforts seem likely to make state government more efficient in the long term.

Some agencies expressed frustration with the COT billing process for infrastructure services, other aspects of infrastructure consolidation, and the process of developing new business applications.

Recommendation 2.1
The Commonwealth Office of Technology should take steps to ensure that the needs of other agencies are being met and concerns are being addressed related to infrastructure costs, support services, specialized business needs, business applications, and billing the agencies.

Many agencies reported difficulty hiring and retaining IT professionals. Much of the state government IT workforce consists of contractors. The state might be able to save money by making changes to attract, hire, and retain more IT employees rather than contractors.

Recommendation 2.2
The Personnel Cabinet, in consultation with the Finance and Administration Cabinet and other agencies, should conduct a classification and compensation study assessing the overall cost of equalizing IT compensation with private industry compared to the cost of continuing to use IT contractors, taking into account such factors as contractor flexibility.

Some large capital IT projects have suffered from cost overruns and delays. Some of the problems appear to arise from the procurement process and others from project management. Agencies are not required to consult with COT when developing their procurements. Each agency is responsible for its own project management, and there is no direct oversight of the way agencies manage IT projects. Improved procurement and project management procedures might reduce losses on large projects.

Recommendation 2.3
The Finance and Administration Cabinet and the Commonwealth Office of Technology (COT) should ensure that all agencies consult with COT at the earliest stages of considering new or updated business applications and that all agencies develop their procurement and project designs with input from COT and the cabinet's Office of Procurement Services.

Recommendation 2.4
The Finance and Administration Cabinet and the Commonwealth Office of Technology (COT), at their discretion, should ensure that all agencies employ certified or experienced project managers for capital IT projects. COT should actively review and measure the progress of such projects and maintain records to develop evidence-based best management practices.

The Internet has created a bridge between state government's IT applications and the world at large, but this comes with risk. Protecting sensitive information about people and private industry has to be balanced against the public's desire for access to state services and information over the Web. The General Assembly passed House Bill 5 in the 2014 Regular Session to specify the procedures for handling inappropriate disclosure of protected information. The Commonwealth Office of Technology operates the IT security tools and specifies the standards that agencies are to follow to protect their IT assets and data. However, there appears to be some lack of awareness among state personnel of security precautions that everyone should take to protect sensitive information.

Recommendation 2.5
The Commonwealth Office of Technology should ensure that all agencies prioritize technology security initiatives and maintain continuing communication and training for their staff on evolving threats and best practices to safeguard sensitive information in their keeping.

Program Review staff examined four specific business applications: the statewide accounting system (eMARS), the statewide human resources system (KHRIS), the public assistance eligibility system, and the motor vehicle information system. The two enterprise applications are more up to date, but they serve many different agencies with differing business requirements, likely explaining the greater number of complaints that were expressed about them than about the two program-specific applications.

EMARS is a comprehensive package that serves all state agencies. Some deficiencies were found, but the most notable issue was its inability to serve all the accounting needs of all agencies. Many agencies supplement the accounting system with their own business applications or manual procedures, creating extra work. It is unrealistic to expect any complex business application to meet all agencies' disparate needs, but there are ways that agency business applications could interact automatically with eMARS to make agency procedures more efficient.

Recommendation 3.1
The Commonwealth Office of Technology should work with the Office of the Controller and the agencies that use the statewide accounting system to elicit all the supplemental procedures and business applications that agencies use to meet their accounting needs. The offices should identify the reasons agencies supplement the accounting system and should develop solutions so that agencies may use the accounting system more efficiently.

Agencies rated KHRIS less highly than eMARS, but KHRIS is newer and has had less time to mature and achieve acceptance. Most agency complaints were related to its lack of an employee self-service time reporting feature, which had been part of the original design.

Both of the program-specific business applications were decades old and in the process of being replaced. Both were reported as performing their basic functions well but being difficult to modify when changes were needed. They suffered from the same inefficiencies as other outdated applications.

Using eMARS and KHRIS, it is not possible to determine accurately the total annual cost of technology in state government. Accounting for IT expenditures on goods and services is improving but still imprecise. It appears likely that IT accounting could be improved greatly if agencies better understood the use of object codes that describe the purpose of purchases in eMARS. The amounts spent for IT staff cannot be determined using available information in eMARS and KHRIS.

Recommendation 4.1
The Finance and Administration Cabinet should produce and maintain a document explaining the intended use of each object code in the statewide accounting system. The cabinet should implement an ongoing process to periodically examine and validate samples of payments from all agencies and take corrective action when patterns of miscoding are found.

Recommendation 4.2
The Commonwealth Office of Technology should work with the Finance and Administration Cabinet and the Personnel Cabinet to develop a means to calculate the full-time equivalents and personnel costs associated with information technology work by state employees.

Chapter 1

Technology In Kentucky State Government

At its December 11, 2013, meeting, the Program Review and Investigations Committee voted to conduct a study of Kentucky agencies to determine whether technology used is up to date and appropriate. The study covered information technology assets, including hardware, software, personnel, and services, at agencies within the executive branch that are within the purview of the governor, agencies of the other statewide constitutional elected officers, the Administrative Office of the Courts, and other agencies.

Major Conclusions

The report has nine conclusions.

The report has nine conclusions.

- Technology is not as visible to the public or to policy makers as are personnel and physical infrastructure like buildings and highways, but it has similar importance to the functioning of the state and is changing and growing at a rapid pace.
- In some cases, technologies that are perceived as inappropriate or out of date are not. Such misunderstandings could be reduced by improved communication and training.
- Some old business applications work well but suffer from lack of support, inflexible programming, user interfaces that are difficult for younger workers to use, and inefficient operation. Replacing such systems would make staff more productive and free up resources for other purposes.
- For large information technology systems that are inappropriate or out of date, agencies often have submitted multiple requests for replacement that have gone unfunded.
- When smaller information technology needs have gone unmet, such as obsolete equipment, it has usually been due to budget limitations.
- The Commonwealth Office of Technology (COT) is focused on consolidating infrastructure equipment and support, which seems likely to save money overall. COT has also begun to intercede with agencies' plans for business applications, attempting to ensure standard development methods, to share common solutions among agencies, and to improve access to data among agencies. These efforts seem likely to make state government more efficient in the long term.

- The state might be able to save money by making changes to attract, hire, and retain more information technology employees rather than contractors. On capital projects, improved procurement and project management procedures might reduce losses from cost overruns and delays.
- Accounting for information technology expenditures on goods and services is improving but still imprecise; the amounts spent for technology staff cannot be determined using available information.
- There is little information to assess the state's progress in improving technology, but the data from this study can serve as a baseline for future comparison.

Types Of Information Technology Assets

Information technology (IT) assets considered for the study included infrastructure, business applications, and Web presence.

For this study, the types of information technology (IT) assets considered were

- infrastructure—the equipment used to accomplish IT tasks,
- business applications—the systems of software and associated equipment used to perform agency business activities, and
- Web presence—the websites that connect state government to the public.

Many IT needs today can be met through online services—storage and applications that reside in locations other than the user's computer, device, or local network. These online services are accessed via the Internet over secure connections. For this report, online storage, applications, and other services are considered as a kind of infrastructure or business application and are included when relevant throughout the report.

Kentucky state government's IT staffing is an asset that is in transition, so this report focuses on the concerns about staffing that were raised by agency leaders. The report does not attempt to assess the appropriateness of IT staffing.

Infrastructure

For this study, infrastructure was divided into four categories: Desktop and personal computers; local networks, servers, and data storage; communications technology, including traditional phone lines and phone systems, cell phones, and teleconferencing; and Internet access.

IT equipment underlies all uses of information technology. In some cases, it is useful to think of a piece of equipment and some of the software that goes with it as a package. An example would be a personal computer with its operating system and office productivity software. For this study, infrastructure was divided into the following categories:

- Desktop or workstation personal computers and their operating systems and office productivity software
- Local networks, servers, and data storage—cabling, wireless connections, servers and their software, and networked data storage (that is, storage not physically inside or attached to a personal computer)
- Communications technology—traditional phone lines, phones, and phone systems; private branch exchanges (PBX); voice over Internet Protocol (VoIP); cell and satellite phones; two-way radio; and teleconferencing
- Internet access—cables, routers, firewalls, and wireless connections used to access the Internet

Business Applications

Business applications are systems of software and equipment that agencies depend on for daily business activities.

Business applications are complex systems of software and equipment. Generally, agency staff depend on business applications to perform many of their daily business activities. For example, agency accounting and budgeting staff use eMARS, and county clerks use the Automated Vehicle Information System. Major business applications often cost millions of dollars to build or purchase and sometimes cost millions of dollars per year to operate.

Business applications may come from several sources. Some are designed and developed in house by an agency or the Commonwealth Office of Technology. Others are developed by an outside vendor according to agency specifications. Commercial off-the-shelf applications are sometimes the starting point for customization to an agency's needs. Occasionally, a commercial application can be used without alteration.

Business applications may reside on an agency server, on a COT mainframe or server, or on the Internet on a vendor's server. Many, or even most, business applications today are used through a browser like Internet Explorer, even though they might reside on an agency's or COT's local network rather than on the Internet.

Many applications operate over the Internet. These include state Web portals that provide the public with direct access to state data and services. In some cases, users have to create an account to log into a portal, but some portals allow users to request specific information from a state database without identifying themselves. For this study, state Web portals that allow the public to access state databases and services are considered business applications.

Business applications can be either enterprise-wide or agency specific. Enterprise applications are used by agencies across state government. Agency applications are used exclusively by one agency or are shared among a small number of related agencies.

Enterprise Applications. A few business applications are enterprise-wide, meaning they are used by agencies across state government. The two major enterprise applications are eMARS and Kentucky Human Resource Information System (KHRIS). All agencies in state government use eMARS as the accounting system, and all state funds are recorded in eMARS. All agencies also use KHRIS as the human resources system. Information about all state employees resides in KHRIS, and the system generates the state employee payroll.[a]

Agency Applications. Most state agencies have business applications that they use exclusively or that they share with a small number of related agencies. For example, the Department for Community Based Services is the primary user of a major in-house system to manage adult and child protective services, and the Kentucky State Fair Board purchased a commercial event management system.

Shared applications include the Kentucky Automated Management and Eligibility System, an in-house system that historically performed public assistance eligibility determination for the Department for Community Based Services and the Department for Medicaid Services. Sometimes applications are shared outside state government, such as the custom-developed Automated Vehicle Information System that is used by the Transportation Cabinet and county clerks, among others. The Kentucky Department of Education contracts for the Munis financial and human resources system that all public school districts use for administration and reporting to the department. Munis is a commercial product accessed via secure Internet connections.[1]

Several agencies share responsibility for the Kentucky Business One Stop, a Web portal application primarily used by business people to obtain necessary forms and to report information to the

[a] The enterprise email system, Microsoft Exchange, is also used by almost all of state government. However, it is an outgrowth of office productivity tools, and this report considers it infrastructure rather than a business application.

state. Business registration, taxation, licensing, and many related activities are expected to be integrated into this portal.[2]

Web Presence

Web presence in this report refers to the websites that the public may use to read information about state government and its services.

Web presence in this report refers to the websites that the public may use to read information about state government and its services. Almost all state agencies have websites of their own. These websites generally provide information about the agency's organization, services, and contacts. The Kentucky.gov website provides a hub that the public can use to obtain general information about state government and to navigate to most state agencies' websites.

This study did not examine state agencies' use of social media.

Oversight Of IT Assets

Commonwealth Office Of Technology

The General Assembly's IT findings provide guidance to state government.

The General Assembly codified its findings related to state government information technology in KRS 42.720. They include the following:

- A single point of contact and spokesperson for all IT matters is necessary and consistent with industry trends.
- Appropriate use of IT can improve productivity, reduce costs, enhance services, and make government more accessible.
- Government-wide planning, investment, protection, and direction of information resources is necessary.
- To use technology most effectively, the state must provide IT infrastructure, direction, and a proficient management structure.
- Oversight of enterprise or other large IT systems and projects is necessary to protect the state's investment and to ensure system integration.
- Key IT staff competencies and adequate support staff are needed.
- The state should take advantage of IT advances to improve services and ensure system integration.
- Sharing of information and IT resources among agencies is the most cost-effective method of accomplishing IT objectives.
- The exercise of the powers of COT is an essential government function.

Ultimate oversight of most executive branch agencies' information technology assets resides with the Commonwealth Office of Technology (COT).

Ultimate oversight of most executive branch agencies' information technology assets resides with the Commonwealth Office of Technology under KRS 42.726. The head of COT is now also known as the state's chief information officer (CIO), and the position was elevated to the governor's Executive Cabinet.[b] At the same time, COT is an agency of the Finance and Administration Cabinet, and the CIO is appointed by and reports to the cabinet secretary.[c]

COT has the following statutory responsibilities, among others:

- Exercising complete responsibility for executive branch technology infrastructure assets and related staff
- Providing information technology technical support and services to all executive branch agencies
- Developing strategies and policies promoting effective state information technology applications as a means of saving money, increasing employee productivity, and improving state services (including access to information) to the public
- Developing a security framework and model governance structure relating to the privacy and confidentiality of personal information held by executive branch agencies[d]
- Developing, implementing, managing, and enforcing information technology directions, standards, and enterprise architecture
- Assuring compatibility and connectivity of state information systems
- Reviewing and overseeing large or complex information technology projects and systems for compliance with statewide strategies, policies, and standards; granting or withholding approval to initiate these projects
- Coordinating multiagency information technology projects
- Promulgating administrative regulations to implement its statutory responsibilities
- Requiring agencies to furnish the necessary assistance, resources, information, records, and advice that COT needs to do its work (KRS 42.726; 42.728(1))

The legislative and judicial branches of government are exempted from the authority of COT under KRS 42.728(2) and (3).

Entities exempted from this authority include the judicial and legislative branches and the state retirement systems (KRS 42.728(2) and (3)). Certain additional entities are exempted specifically from COT's control of infrastructure: statewide

[b] This position is referred to in the statutes as the executive director of COT or the chief information officer. This report uses *chief information officer*.
[c] Changes were implemented by HB 208 of the 2014 Regular Session; previously, similar changes were made by executive order EO 2012-0880.
[d] This provision becomes effective January 1, 2015.

constitutional offices, public postsecondary institutions, services provided to local school districts, and certain independent agencies (KRS 42.726(1)(f)). Exempted agencies may choose to contract with COT to meet technology needs.[3] For example, the Office of the Attorney General has chosen to participate in COT's IT Infrastructure Initiative.[4] Such entities may choose from a range of services and negotiate a mutually acceptable agreement with COT.[5]

The Technology Advisory Council consists of business, financial, and technology leaders from executive branch agencies. Minutes from council meetings indicate that it has played a major role advising the chief information officer and disseminating COT policies to the agencies.

COT operates with a newly chartered Technology Advisory Council consisting of business, financial, and technology leaders from executive branch agencies. It meets at least quarterly, and its minutes indicate that it has played a major role advising the CIO and disseminating COT policies to the agencies.[e] At the July 2014 meeting, attendees included a member of the secretaries' offices of the Cabinet for Health and Family Services and the Transportation Cabinet, a member of the Office of State Budget Director, a deputy commissioner of the Department for Environmental Protection, and technology representatives from several agencies.[6]

The statutory Kentucky Information Technology Advisory Council does not appear to have met since 2002.

KRS 42.732 establishes the Kentucky Information Technology Advisory Council. The council consists of the CIO; state budget director; state librarian; and representatives of the legislative branch, judicial branch, public universities, public schools, private citizens, local governments, area development districts, media, educational television, the Public Service Commission, and the Chamber of Commerce. The council is to advise the CIO and discuss emerging technologies. The statute was most recently amended by HB 5 of the 2014 General Session. However, the council has not met for several years. It was listed as inactive in the 2012 Program Review staff report on boards and commissions, and the Kentucky electronic records archive contained no minutes after 2002. Appendix B has more information about both councils.

The IT Infrastructure Initiative, begun in August 2013, is a project to consolidate purchasing and support of IT infrastructure at COT.

The IT Infrastructure Initiative, begun in August 2013, is a project to consolidate purchasing and support of IT infrastructure at COT. Agencies are undergoing consolidation in a planned sequence, and the project is scheduled to be completed in August 2015. All IT infrastructure assets, including support staff, are being reassigned to COT, and all future purchases must be made through COT after approval from the Finance and Administration Cabinet (KRS 42.726; EO 2012-0880).

[e] The council's charter states that there may be up to three members from each cabinet or major agency. The COT website states that they are chosen by the agencies.

Capital Planning Advisory Board

The Capital Planning Advisory Board advises the branches on information technology systems when the expected expenditure is $600,000 or more. The board produces a state capital improvement plan by November 1 of each odd-numbered year and submits it to the governor, chief justice, and Legislative Research Commission.

The General Assembly created the Capital Planning Advisory Board (CPAB) in KRS 7A.100. The board is

> empowered to prepare a comprehensive state capital improvement plan and to make funding recommendations to each branch head as to state spending for capital projects.

The board consists of members from all three branches of state government. CPAB advises the branches on statutorily defined information technology systems when the expected expenditure is $600,000 or more (KRS 7A.010(1)(f)). *Information technology system* here means any related computer or telecommunications components providing for a specific business purpose and that contain one or more of the following: hardware, software, professional services, or digital data products (KRS 7A.010(5)). The board produces a state capital improvement plan by November 1 of each odd-numbered year and submits it to the governor, chief justice, and Legislative Research Commission (KRS 7A.120).

Capital Projects And Bond Oversight Committee

State agencies are required to provide the Capital Projects and Bond Oversight Committee quarterly status reports on ongoing capital projects, including capital IT projects. The committee has the authority to review the progress of capital projects and approve interim fund transfers and bond issues.

The Capital Projects and Bond Oversight Committee of the General Assembly is established in KRS 45.790. State agencies are required to provide the committee quarterly status reports on all ongoing capital projects (KRS 45.793). COT has the responsibility to submit the report on all executive branch capital IT projects, except for those of public universities (KRS 45.818). Under KRS 164A.560 and 164A.580, universities may manage their own capital projects and submit reports independently of the Finance and Administration Cabinet. Technology projects conducted by constitutional offices appear on a report from the Finance and Administration Cabinet, and the Administrative Office of the Courts is required to submit its own IT projects to the committee (KRS 26A.168).

The committee has the authority to review the progress of capital projects and, if legal requirements are not being met, to ask the Legislative Research Commission to file for an injunction to stop the project (KRS 45.795). Subject to specific statutory exceptions in KRS Chapter 45, whenever an agency wishes to move funds from another source into a capital IT project account, the agency must present the proposal to the committee, which may disapprove

it (KRS 45.760(6), 45.770, and 45.800).[f] Agencies authorized to issue bonds must also submit any plans for bond issuance to the committee, which may disapprove them (KRS 45.810).[g] [h] In either case, the agency head may override the committee's decision.

Surveys Used In This Report

A survey asking primarily policy questions was sent to cabinet and department leaders. A second survey asked detailed technical questions of agencies at the department level.

Program Review staff administered two surveys. The first, primarily asking policy questions, was sent to cabinet and department leaders. The second, asking technical questions about each agency's technology, was sent to agencies at the department level with instructions to collect detailed information from the appropriate people. Appendix A describes how the study and surveys were conducted. Appendix C and Appendix D show the results of the policy and technical surveys.

[f] Some transfers are not subject to committee action but must be reported either to the committee or LRC (KRS 45.780; 45.782).
[g] The Turnpike Authority of Kentucky is exempt from this review.
[h] Committee staff reported that bonds are seldom used to finance capital IT projects.

Chapter 2

Appropriateness Of Technology

This chapter discusses several factors that affect the appropriateness of the technology used in state government, such as its age, funding, the IT workforce, standards and consolidation, procurement and project management, and security. These factors affect the selection, design, broadness of applicability, and timing of replacement of technology solutions.

Usability, Enterprise Standards, And Consolidation

There is a growing awareness that technology can be standardized and shared—both infrastructure and business applications.

Asking whether technology is appropriate and up to date is similar to asking how usable it is for the intended purpose. There is a growing awareness that technology can be standardized and shared—both infrastructure and business applications. As focus shifts to how technology can best serve state government as a whole, appropriateness becomes a question of how usable a technology solution can be across the enterprise rather than at a single agency. Usability even applies to the way business applications are built, so that components of an application might be shared, even if the entire application is not. Interoperability—the ability of applications to communicate and share data with each other across the enterprise—is another factor that determines how appropriate or usable technology resources will be.

An organization can achieve economies of scale by consolidating aspects of IT management and standardizing IT assets.

An organization can achieve economies of scale by consolidating aspects of IT management and standardizing IT assets. If all state employees use the same type or even brand of computer, operating system, productivity software, browser, network, and storage, then support staff familiar with the standard infrastructure can work interchangeably and develop deeper expertise than they could if they had to support a variety of assets. Statewide purchase contracts and software licenses can be obtained at lower cost than separate ones at each agency. When business applications are purchased or developed, they could be easier to maintain, more interoperable, and potentially shared among more agencies if the state required uniform development tools or platforms, standard procedures, and consideration of other agencies' business needs. All these practices may reduce costs and increase the appropriateness of IT resources.

Historically, agencies have worked in relative isolation, developing what are called "silos" of software and data that are difficult to share.

The enterprise perspective requires agencies to look beyond their specific needs and consider other agencies. Historically, agencies have worked in relative isolation, developing what are called "silos" of software and data that are difficult to share. Over the past several years, the Commonwealth Office of Technology and its predecessor office developed enterprise standards that specify the types of IT infrastructure that agencies may purchase and the procedures to be used when purchasing and developing business applications. COT's stated objectives for its enterprise standards include promoting access to information between agencies, reducing duplicated information and systems, and simplifying business applications. Shared and compatible applications and data better serve each agency's business needs and improve the economies of scale across state government.

Table 2.1 shows the infrastructure and business application environments reported in the Program Review staff's technical survey. Most agencies reported having totally compatible environments or partially compatible ones where some silos persist. More than 88 percent of agencies reported at least some compatible infrastructure, and more than 84 percent reported having at least some compatible business applications. Almost 12 percent indicated that they operated primarily in a silo application environment.

Table 2.1
Agency Infrastructure And Business Application Compatibility

Environment	Incompatible	Mixed	Compatible	Other
Infrastructure	7.8%	41.6%	46.8%	3.9%
Application	11.8	44.7	39.5	3.9

Note: Number of respondents: 77 for infrastructure, 76 for applications.
Source: Program Review technical survey of state agencies.

A 2012 consultant's report emphasized infrastructure consolidation as well as standardization and sharing of business applications.

In 2012, COT engaged Pacific Technologies Inc. (PTI) to report on Kentucky's technology management, organization, and costs. The assessment made the following recommendations that emphasized infrastructure consolidation. The last two went beyond infrastructure to promote standardization and sharing of business applications across the enterprise.

- Establish a new cabinet level office of technology and hire a chief information officer.
- Consolidate technology infrastructure to provide more uniform and cost-effective equipment and support.
- Consolidate infrastructure support staff to reduce labor costs and increase efficiency.

- Focus agency IT efforts on business applications that are specific to agency needs.
- Establish mechanisms for state agencies and the CIO to transparently and accountably communicate, negotiate, and collaborate on technology decisions.
- Empower the CIO to oversee IT procurement, capital IT projects, and IT vendor performance.[7]

The report projected savings of $32.1 million to $55.6 million over the first 4 fiscal years and ongoing annual savings of $16.7 million to $27.7 million thereafter.[8] Consolidation of infrastructure staffing was projected to produce more than half of the savings. COT implemented many of the recommendations after the issuance of executive orders EO 2012-0880 and EO 2013-0403; the former was codified in part, and the latter was confirmed, by HB 208 of the 2014 Regular Session.

Infrastructure Consolidation Status

Infrastructure consolidation is in various stages of completion across agencies.

Infrastructure consolidation is being done in stages. The first agency to complete consolidation was the Office of State Budget Director. Table 2.2 lists the status of other agencies. Following consolidation, COT provides infrastructure support, data storage, enterprise server processing, voice communication support, user support, and optional application support and development assistance for the agencies under its auspices. COT then directly bills agencies preset rates for these services.

Table 2.2
Infrastructure Consolidation Status

Cabinet Or Agency	Status	Notes
Administrative Office of the Courts	N/A	Not planned
Cabinet for Health and Family Services	Under way	Began 8/09/2013
Cabinet for Economic Development	Completed	Completed 03/27/2014
Council on Postsecondary Education	Scheduled	Begins 3/01/2015
Energy and Environment Cabinet	Completed	Completed 04/16/2014
Education and Workforce Development Cabinet	Under way	Began 8/15/2014
Finance and Administration Cabinet	Scheduled	Begins 3/01/2015
General Government	Scheduled	Begins 1/01/2015
Justice and Public Safety Cabinet	Scheduled	Began 10/1/2014
Labor Cabinet	Scheduled	Begins 9/15/2014
Office of Attorney General	Under way	Began 8/15/2014
Office of Homeland Security	Completed	Completed 02/19/2014
Office of State Budget Director	Completed	Completed 08/23/2013
Personnel Cabinet	Under way	Began 2/7/2014
Public Protection Cabinet	Completed	Completed 04/16/2014
Transportation Cabinet	Under way	Evaluation phase
Tourism, Arts and Heritage Cabinet	Scheduled	Begins 03/01/2015

Note: The overall consolidation is scheduled to be completed on August 31, 2015.
Source: Commonwealth Office of Technology consolidation webpage.

It is difficult to calculate the current monetary effect of the consolidation because it is only partially complete. Some agencies pay more for infrastructure after consolidation.

It would be difficult to calculate the current monetary effect of the consolidation because it is only partially complete. Some agencies expressed concern that their IT infrastructure was more expensive after consolidation, and COT officials acknowledged that some agencies do pay more. This occurs primarily when an agency was getting by with older infrastructure but now is required to be on the same replacement and upgrade schedule as the rest of state government. COT pointed out that the Office of State Budget Director and COT are working to ensure that agency budgets contain enough funding to cover their IT expenses and to assist them in saving money by other means.[9]

The most frequently mentioned issue regarding the consolidation was that agencies found the COT infrastructure billing statements difficult to understand and verify; several agencies asserted the billing was frequently incorrect.

Program Review staff's agency interviews and surveys solicited comments about the consolidation. The most frequently mentioned issue was that agencies found the COT infrastructure billing statements difficult to understand and verify; several agencies asserted the billing was frequently incorrect. COT acknowledged that the bills were difficult to understand and proposed facilitating dissemination of systems that agencies had developed to interpret them.[10]

Many comments stated that the response time for support had become slower. COT noted that it did not have a way to assess this

because agencies did not have records showing the response times of their own support staff prior to consolidation.[11] Other complaints included that the agency was not permitted to procure technology to meet its specialized needs, that such procurements took so long that it impaired the agency's ability to operate, and that the agency could provide better support for specialized infrastructure than COT could.

Application Consolidation And Oversight

COT and its Technology Advisory Council have been working to bring agencies together in the development or purchase of business applications.

At this time, COT is working primarily on consolidation of infrastructure, but the agency and its Technology Advisory Council have been working to bring agencies together in the development or purchase of business applications. They are looking for opportunities for agencies to share rather than duplicate applications.[12] This is an area in which COT and the council should increase efforts after infrastructure consolidation is completed.

The council serves to advise the CIO and disseminate COT policy across agencies.[13] In addition to the council, COT has assigned someone to each agency as a business relationship manager. The purpose is to keep COT aware of agencies' needs and to facilitate solutions at each agency.[14] When agencies consider whether to automate a business process or upgrade or replace an existing business application, COT should be able to provide advice.

Recommendation 2.1

Recommendation 2.1

The Commonwealth Office of Technology should take steps to ensure that the needs of other agencies are being met and concerns are being addressed related to infrastructure costs, support services, specialized business needs, business applications, and billing the agencies.

Obsolescence Of Applications

Although older business applications may be adequate to meet agency business needs, current technologies often improve employee productivity and are less costly to modify and maintain.

Technology assets must strike a balance between appropriateness and cost. Often, older business applications are adequate to meet the business needs of an agency. Program Review staff found applications that were decades old and were still performing well. However, as they age, even these usable applications begin to show disadvantages compared with the most up-to-date alternatives. Often, current technologies improve employee

productivity and are less costly to modify and maintain. These productivity savings, while hidden, could be significant.

An independent study found that the challenges of aging technology are most significant in enterprise resource planning systems such as financial, accounting, human resources, and payroll applications.

The National Association of State Chief Information Officers found that the challenges of aging technology are most significant in enterprise resource planning systems such as financial, accounting, human resources, and payroll applications.[15] These applications have to work together with other systems like federal grants, tax codes, and procurement. Kentucky replaced two such aging systems within the past 10 years: the statewide accounting system and the human resources and payroll system.

According to the association's 2008 study, supportability, risk, and agility were key elements affecting older systems. IT staff to support aging technology are becoming harder to find. A system's agility refers to how quickly and effectively it can adapt to changing business needs. The study recognized these as significant "drivers toward modernization."[16]

Older systems, whether developed in house or by a vendor, most likely no longer receive support from an associated vendor.

Aging systems operate within an older technical infrastructure and must be adapted through continuous customization. Perhaps the most important components of supportability are software upgrades and support, which often include the latest security patches and business process solutions. Commercial off-the-shelf systems typically receive these from the vendor; in-house systems built on contract may also receive upgrades and support from a vendor, but some depend on agency staff. Older systems, whether developed in house or by a vendor, most likely no longer receive support from an associated vendor. In the case of systems that continue to receive vendor support, the costs of maintenance and upgrades increase as the system ages.[17]

Often, technical knowledge is lost as personnel familiar with certain systems retire, and acquiring needed expertise can be costly as fewer IT professionals are familiar with the older platforms.

Systems designed in house may require specific, in-depth system knowledge that is no longer present among staff. Documentation may be sparse or nonexistent. Maintaining older systems demands technical knowledge, particularly of the code in which the system was written, in order to modify the system to meet changing business requirements. Often, technical knowledge is lost as personnel familiar with certain systems retire, and acquiring needed expertise can be costly as fewer IT professionals are familiar with the older platforms.

Paradoxically, another source of inefficiency with older systems is that younger personnel, who are familiar with contemporary user interfaces, have no experience with older user interfaces. This

difficulty was mentioned by agencies that are in the process of replacing aging applications.

Funding For Technology

Agencies with large IT systems that are inappropriate or out of date have often submitted multiple requests for replacement that have gone unfunded.

Technology is not as visible to the public or to policy makers as are personnel and physical infrastructure like buildings and highways.[18] Agencies with large IT systems that are inappropriate or out of date have often submitted multiple requests for replacement that have gone unfunded. When smaller IT needs have gone unmet, such as obsolete equipment, it has usually been reported as due to operational budget limitations.

As shown in Table 2.3, responses to the Program Review staff's policy and technical surveys rated funding as the most prevalent challenge both for infrastructure and for applications. Number of support staff, which appears to be related to funding, was rated second or third overall as a barrier to improving technology.

Table 2.3
Major Challenges To Improving Technology Policy And Technical Survey Ratings

				Major Problem (%)		Rating
Survey	**Technology**	**Challenge**	**Rank**	**Often**	**Sometimes**	**(1-4)**
Policy	Infrastructure	Funding	1	40	41	3.1
		Support staff	3	18	41	2.7
	Applications	Funding	1	36	36	3.0
		Support staff	2	14	50	2.6
Technical	Infrastructure	Funding	1	35	44	3.1
		Support staff	2	21	35	2.6
	Applications	Funding	1	34	39	3.0
		Support staff	2	9	47	2.6

Note: Number of respondents: Policy survey: 78 for infrastructure, 74 for applications. Technical survey: 77 for infrastructure, 76 for applications.
Rating was on a scale of 1=Never a major problem, 2=Seldom a major problem, 3=Sometimes a major problem, 4=Often a major problem.
The second most highly ranked challenge for infrastructure improvement on the policy survey was "Compatibility with other systems and data."
Source: Program Review staff policy survey of leaders and technical survey of agencies.

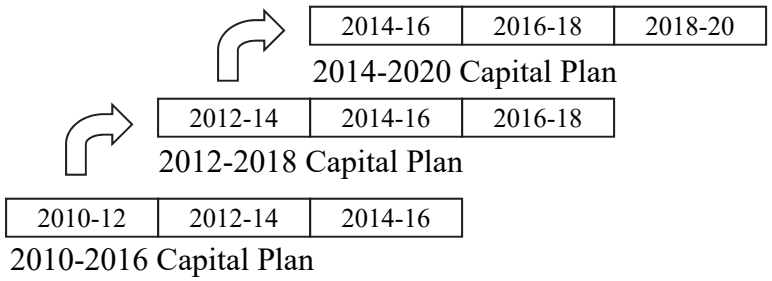
Capital Planning Process

State capital plans are created every 2 years and cover 6-year periods.

Capital planning in the commonwealth consists of successive capital plans covering 6-year periods. A new plan is created every biennium. As Figure 2.A illustrates, these plans move forward every 2 years by including projects that did not receive funding in the previous budget and by adding new projects. Projects must

meet a $600,000 threshold to be considered in the capital plan. Proposals from agencies, with the exception of the Department of Highways, must be submitted by April 15 of the budget year (KRS 7A.120). COT reviews executive branch IT projects independently and sends its findings and priorities in report form to the Capital Planning Advisory Board for consideration. The board reviews agency capital project proposals over a 6-month period and makes recommendations in the state capital plan.

Figure 2.A
Capital Planning Process



Source: Program Review staff compilation of information from Capital Planning Advisory Board staff.

COT and Technology Advisory Council conduct a review of IT requests contained in the Capital Planning Advisory Board (CPAB) database, and COT creates a list of recommended projects, which is then sent to the board.

Agencies submit capital IT requests, along with other capital project requests, to the CPAB database. COT, along with a subcommittee of the Technology Advisory Council, conducts a review of IT requests contained in the CPAB database and creates a list of recommended, "high-value" projects and strategically important projects, which is then sent to the board. The board can view both COT's recommendations and the original agency requests while devising the capital plan. The board does not have to accept COT's recommendations and may choose to recommend projects that were not recommended by COT.

The board determines which projects to recommend based on testimony from the requesting agency, the recommendations of COT, the cost of the project as estimated by the agency, and other factors. In November, the board submits the final capital plan to the governor, the chief justice, and the Legislative Research Commission (KRS 7A.120). The plan lists recommended projects in alphabetical order without any indication of priority.

There is no clear measure of the capital plan's influence in the development of the governor's budget or the legislative budget bill.

Neither the Office of State Budget Director nor the General Assembly is compelled to follow the recommendations in the capital plan. There is no clear measure of the plan's influence in the development of the governor's budget or the legislative budget bill. For comparison, Appendix E describes capital IT planning in Virginia and North Carolina.

Cost Of Requested Capital IT Projects

In this and the following sections, projects are limited to state agencies. The report excludes projects from the Kentucky Department of Education for local school districts; from the Council for Postsecondary Education for schools, libraries, and state institutions of higher education; and from institutions of higher education themselves.

For the 2014-2016 COT report to CPAB, the total cost of all agency-requested capital IT projects was nearly $268 million from all funding sources.

The board reviews all requested projects but recommends only those that contain some general fund or state bond dollars. Projects funded wholly by restricted fund, road fund, or federal dollars are not included in the recommendations. From the 2014-2016 COT report to CPAB, the total cost of all agency-requested capital IT projects was nearly $268 million from all funding sources.[19] The total amount for projects requesting some general fund allocation was $231 million. COT identified 15 high-value IT projects, totaling more than $101 million. The state CIO further added seven strategically critical projects at a cost of more than $108 million, bringing the total cost of COT-recommended projects to just less than $210 million from all funding sources. Of that amount, the total cost of recommended projects that included any general funds was more than $188 million; the general fund portion of that total was almost $86 million.

Cost Of Capital IT Projects In 2014 Budget

According to LRC staff, the 2014 budget included an appropriation of almost $99 million, less than half the COT recommendation, for capital IT projects.

According to LRC staff, the 2014 budget included an appropriation of almost $99 million, less than half the COT recommendation, for capital IT projects.[20] Of that total, less than $5.8 million was directly from the general fund; another $42.3 million was from other state funds, such as the road fund and bond funds; and another $8.4 million was restricted funds. Program Review staff determined that more than two-thirds, $70 million, went to the Next Generation Kentucky Information Highway project, none of

which was paid directly with general funds.[a] This left $29 million for all other capital IT projects.

Review Of Capital IT Projects Requested By Agencies

Most projects are appearing in at least their second plan. The majority of resubmitted projects appear with no changes from the previous plan.

The CPAB data examined by staff reveal several trends and themes. Other than a handful of what COT called "mega projects" that exceeded $50 million, the typical cost of projects has varied between $1.5 million and $3.5 million. Perhaps most important is that the majority of projects are appearing in at least their second plan. Further, of those projects that have been resubmitted, the majority of them are resubmitted with no changes from the previous submission. There were multiple projects, submitted for at least the second time, that the agency had ranked as its top priority. Of these projects, more than three-fourths were requests for updating aging software systems or applications. It seems likely that lack of funding has hindered agencies from developing and acquiring appropriate and up-to-date technology.

Agencies submit their capital projects via an online database maintained by LRC staff. Program Review staff examined the CPAB data for plans spanning the 2010-2016, 2012-2018, and 2014-2020 planning periods for all active project requests that were submitted by state government agencies as "Information Technology Systems" for their own use.

Within the last three capital plans, 246 IT projects were submitted. Of these, 166 had been submitted in a previous plan.

Of the 246 IT projects over these periods, 166 had been submitted in a previous plan. In order to account for resubmissions, Table 2.4 lists the top agencies by number of projects submitted separately for each plan period. The projects submitted by these agencies represent more than 58 percent of all of the IT projects among the last three plans. Across the examined plan periods, the Commonwealth Office of Technology submitted the most projects. The total number of submitted IT projects declined markedly between the 2010 and 2012 plans and continued to decline in the 2014 plan. COT speculated in its reports to CPAB in 2011 and 2013 that the decline in projects was a result of budget limitations.[21]

[a] This project was not included in the agency's submission to CPAB, so it was not reviewed by CPAB or COT prior to inclusion in the budget request. Its funding is from state bonds, federal funds, and private funds.

Table 2.4
Top Agencies By Number Of Requested Capital IT Projects
2010 To 2020

Plan Period (Projects)	Agency	Projects	Percent Of Total
2010-2016 (119)	Commonwealth Office of Technology	18	15.1%
	Department of Education	13	10.9
	Cabinet for Health and Family Services*	11	9.2
	Transportation Cabinet	9	7.6
	Council on Postsecondary Education	8	6.7
	Kentucky Lottery Corporation**	8	6.7
	Total	67	56.3
2012-2018 (70)	Commonwealth Office of Technology	8	11.4
	Kentucky Lottery Corporation	7	10.0
	Kentucky State Police	7	10.0
	Department for Public Health	6	8.6
	Cabinet for Health and Family Services*	6	8.6
	Kentucky Educational Television**	6	8.6
	Total	40	57.1
2014-2020 (57)	Kentucky Lottery Corporation	8	14.0
	Kentucky State Police	7	12.3
	Kentucky Educational Television	5	8.8
	Department for Public Health	4	7.0
	Four additional agencies with 3 projects each**	12	21.0
	Total	36	63.2

Note: Percentages will not sum to 100; this table contains only the agencies with the highest number of requests in each period. Individual percentages do not add to total percentages because of rounding.
* These are projects not assigned to a specific department in the cabinet but to "General Administration and Program Support."
** In the 2010-2016 and 2012-2018 plans, there were two agencies with the fifth highest number of projects, and both are shown. In the 2014-2020 plan, there were four agencies with the fifth highest number of projects (three each), so they are not shown separately but in total: Department of Vehicle Regulation, Education and Workforce Development Cabinet General Administration and Support, Kentucky Teachers' Retirement System, and Transportation Cabinet Secretary's Office.
Source: Capital Planning Advisory Board data, plan periods 2010-2016, 2012-2018, and 2014-2020.

Table 2.5 shows that the value of a typical project increased in the 2012 plan and declined in the 2014 plan to the same value as in 2010. The total cost of requested projects declined somewhat between 2010 and 2012 and declined significantly in 2014. This pattern is consistent with the assumption of budget limitations.

Table 2.5
Costs Of Requested Capital IT Projects
(In Millions Of Dollars)

Plan Period	Projects	Median Cost	Highest Cost	Total Cost
2010-2016	119	$2.0	$220.9	$758.0
2012-2018	70	3.5	150.0	668.9
2014-2020	57	2.0	85.1	269.9

Source: Capital Planning Advisory Board data, plan periods 2010-2016, 2012-2018, and 2014-2020.

The highest-cost projects and the total cost of all projects largely reflect the presence of what COT called "mega projects."

The highest-cost projects and the total cost of all projects largely reflect the presence of mega projects. For illustration in Table 2.6, Program Review staff selected projects whose cost was projected as $50 million or more. The decline in the cost of the public assistance eligibility system was partly a result of being split between Medicaid and other assistance programs and then being recombined to take advantage of the Medicaid system's new architecture. The eligibility systems are covered in greater detail in Chapter 3.

Table 2.6
Mega Projects Requested
2010 To 2020
(In Millions Of Dollars)

Project Description	2010-2016 Cost	2012-2018 Cost	2014-2020 Cost
Public assistance eligibility system replacement and expansion	$220.9		
Public assistance eligibility system replacement and expansion after Medicaid eligibility was funded at $50 million		$150.0 ($200.0)*	
Public assistance eligibility system replacement and expansion after plan was changed to combine with Medicaid eligibility at $50 million			$80.0** ($130.0)*
Child support system replacement	$85.1	$85.1	$85.1
Medicaid eligibility replacement		$50.0	

* This project and the Medicaid eligibility replacement will result in a single eligibility system, so the amount in parentheses shows the combined project cost.
** This project was included in the published capital plan, but the agency removed it from the 2014-2020 final CPAB database because it was funded with restricted funds in the 2013 Interim under KRS 45.760(6). Because it was not active in the CPAB data, it does not appear in any of the other tables.
Source: Capital Planning Advisory Board data, plan periods 2010-2016, 2012-2018, and 2014-2020.

Persistence Of Projects Across Plan Periods

If a project submitted by an agency is not funded, agencies can resubmit the project for inclusion in the next plan.

If a project submitted by an agency is not funded, the agency can resubmit the project for inclusion in the next plan. Of the 246 IT projects in the three plans examined, 166 projects, approximately 67 percent, had been submitted in a previous plan. Table 2.7 shows the breakdown by plan period. Of the 163 active projects that had been previously submitted and indicated whether the request had changed, the majority were resubmitted as exactly the same project.

Table 2.7
Capital IT Projects Requested In Previous Plans

Plan Period	Projects	Resubmitted Projects	Percent Of Projects	Unmodified Projects	Percent Of Resubmitted Projects*
2010-2016	119	82	69%	58	72%
2012-2018	70	42	60	30	73
2014-2020	57	42	74	27	66

* The percentages of unmodified resubmitted projects are based on 81, 41, and 41 resubmitted projects because the response to this question was missing for three resubmitted projects.
Source: Capital Planning Advisory Board data, plan periods 2010-2016, 2012-2018, and 2014-2020.

Some agencies' requests consisted entirely of resubmitted projects.

Some agencies' requests consisted entirely of resubmitted projects. In the 2010-2016 plan, the Kentucky Department of Education (13 projects), Council on Postsecondary Education (8), and Kentucky Lottery Corporation (8) had the largest number; in the 2012-2018 plan, the agencies with the largest number were COT (8), Kentucky State Police (7), and Kentucky Educational Television (6); and in the 2014-2020 plan, they were the Kentucky Lottery Corporation (8), Kentucky State Police (7), and Kentucky Educational Television (5).

Agencies must provide a priority ranking for projects in the first biennium of the planning period that are at least partially funded from the general fund, agency bonds, or road funds. Projects funded exclusively from other sources need not be given priorities. Priority rankings, when available, vary considerably. However, there are numerous projects, appearing for at least the second time, that were ranked as one of the agencies' top priorities during the plan period in which they were submitted.

Program Review staff looked separately at nine resubmitted projects that agencies ranked as their top IT priority. Seven of the nine were requests to replace or upgrade aging software systems or applications.

Program Review staff looked separately at nine resubmitted projects that agencies ranked as their top IT priority.[b] No pattern was found in the costs of resubmitted top priority projects, ranging from a low of $800,000 to a high of $50 million. A common theme did appear in the descriptions of these projects. Seven of the nine were requests to replace or upgrade aging software systems or applications. For example, in both the 2010-2016 and 2014-2020 plans, the Transportation Cabinet's top request was for upgraded software for construction contract estimating and awards and project management.[c]

Projects of lower priority have been requested for longer periods. One system was first submitted by the Department for Public Health in the 2004-2010 plan period and in each period since in somewhat different versions. The 2014-2020 project was for replacement of the department's local health department reimbursement and accounting system, which is now approximately 30 years old. The current request was the cabinet's and the department's highest IT priority; it remained unfunded.[d] In another example, the Kentucky State Police first requested an infrastructure upgrade in the 1998-2004 plan period. The department reported that it had been using operating funds to replace older equipment as it became inoperable.[e]

State Technology Workforce

Hiring and retaining IT staff is becoming increasingly difficult for state governments nationwide. Overall demand for IT professionals has led to low unemployment and increasing salaries. State IT salaries well below market rates were often cited as the primary difficulty, probably because states facing limited revenues have been unable to match market salaries.

[b] In order to be considered, the agency must have assigned a priority to at least three IT projects in the plan period.
There were 10 resubmitted top priority projects, but two were for the same project in successive plan periods, so those two were counted as one project. The data for each plan period do not have a project's priority from previous plan periods. Program Review staff used the priority for the project during the plan period in which it was last submitted.
[c] This project was counted as one of the nine top priority resubmitted projects.
[d] There were only two prioritized public health IT projects in this plan, so it was not included in the above set of nine projects.
[e] The effect of COT's infrastructure consolidation on this project is not known.

IT Salaries In Kentucky State Government

Many Kentucky agencies reported that they had difficulty finding and hiring qualified IT personnel, primarily because state salaries were lower than those of private industry.

Many Kentucky agencies reported that they had difficulty finding and hiring qualified IT personnel, primarily because state salaries were lower than those of private industry. Of the agencies that addressed the staffing issue on Program Review staff surveys, 36 of 39 technical survey comments and 30 of 32 policy survey comments stated that hiring was a major concern. The main issue was inadequate salary.[f]

KRS 18A.110(7)(b) authorizes the Personnel Cabinet, in consultation with the appointing authorities and the state budget director, to set the pay grades for merit employees. Statute directs the cabinet to set salaries taking market rates into account, but the cabinet must also consider whether state funds are available to support the salaries. Budget shortfalls in the past decade have made it difficult to increase any state expenditure.

IT Recruitment And Retention

Patrick Mallory, a consultant at Deloitte, recommended improving the portability of public-sector pensions into the private sector and strengthening state government relationships with state university IT programs; he mentioned some examples of the public sector's attempting to improve its position relative to private industry without raising salaries.[22] In Boston, Massachusetts, city leaders invested in targeting IT students with paid internships and fellowships that provide them experience and an introduction to public service.[23] In Georgia, county governments offered interns a start in government with a promise of private sector jobs, hoping to attract talent that would return to government service later.[24] New Jersey's Commission on Science and Technology facilitates university and private-sector engagement and encourages universities to apply innovative ideas to meet state needs.[25]

The General Assembly has expressed awareness that additional recruitment and retention efforts were needed. KRS 42.720 asserts that career and professional development programs for IT staff are needed, as well as public-private partnerships.

In the past, COT hired interns through the Personnel Cabinet's existing programs, some of whom later became full-time employees or contractors. In recent years, this practice has been limited due to budget constraints, but COT is attempting to revitalize the program in concert with state universities.[26]

[f] The remaining respondents chose not to comment on hiring.

A number of leaders pointed to scholarship programs within their agencies that are designed to lure high-quality personnel in relevant fields, asserting that similar programs could attract current IT students.

In discussions with Program Review staff, some agency leaders indicated that this is also a strategy that they endorse. A number of leaders pointed to scholarship programs within their agencies that are designed to lure high-quality personnel in relevant fields, asserting that similar programs could attract current IT students. They also commented that improved marketing could entice recent IT graduates to work with cutting-edge technology while doing important public service work. However, the leaders asserted that no strategy is likely to be effective unless there is an increase in salary for state IT personnel.

Effect Of Merit Employee Caps

At this time, the number of permanent full-time merit employees is well below the statutory cap of 33,000 (KRS 18A.010(2)). If the state workforce ever exceeded that cap, it would serve to limit IT hiring along with all other hiring. In the same way, any policies that limit the number of positions an agency may fill create limits on IT hiring. One such policy is executive order EO 2008-0011, which ordered the state workforce to be reduced by attrition.

Contract IT Labor

Available information suggests that an IT contract worker costs more per hour than a comparable employee hired at the going rate plus typical benefits. What is not clear is the exact difference and whether other factors sometimes make contracting a cost-effective choice.

Because state government's IT salaries are significantly lower than the market rate, contract labor costs 50 percent more than a state employee would cost.

Because state government's IT salaries are significantly lower than the market rate, contract labor costs 50 percent more than a state employee would cost. A contractor averages $30,536 more annually than a state employee.[27] However, because it is difficult to fill state IT positions with equally qualified personnel, it would not be possible to save that amount by hiring instead of contracting. Rather, agency leaders and the PTI report stated that once contracted IT staff develop a level of familiarity with an agency's IT environment, they are generally so valuable that they are kept on contract for extended periods of time for ongoing support and to work on a backlog of other projects. Agencies also reported that contracting companies recruit valuable state staff, whom the agency then has to retain on contract at a higher rate.

When discussing whether contractors could be replaced by employees, the PTI report considered only staff supporting IT infrastructure. This labor pool, consisting of employees and

contractors, could be reduced through consolidation. In the process, existing state employees could be kept to replace contract staff. However, the report acknowledged,

> There may be some contractors whose knowledge and skills cannot be easily substituted. For these, the Commonwealth CIO would weigh the costs and benefits of offering them conversion to permanent staff. This may require writing narrowly defined position descriptions in order to pay a market salary. [28]

In other words, it would be necessary to offer higher salaries to bring key contractors on board.[g] Eliminating other contractors would be possible only because the workload could be reduced to a level that the existing state workforce could handle.

An independent report stated that in 2012 contracted IT personnel represented approximately 28 percent of state government's IT workforce.

The PTI report stated that in 2012 contracted IT personnel represented approximately 28 percent of state government's IT workforce. This was 15 percentage points higher than the national average of 13 percent. Contractor costs disproportionately made up 37 percent of the commonwealth's IT labor costs. [29]

According to the Gartner Research Institute, as well as interviews with agency leaders, contracting may result in a lack of in-house expertise.[30] State agencies often need specialized expertise to deal with custom-built applications as well as aging systems and infrastructure. When much of this expertise is under contract, future costs could rise significantly, or the loss of a contract could cause serious problems. Moreover, in-house staff generally will be more familiar with an agency's services and business processes and might be better able to train future hires.

Contracting for IT personnel can provide an agency with a number of benefits, primarily greater staffing flexibility.

Contracting for IT personnel can provide an agency with a number of benefits, primarily greater staffing flexibility. Contracted personnel can complete time-limited projects and then leave. If a project is terminated or assigned a lower priority, contracted staff can easily be decreased. Similarly, if a project is reinstated or given a higher priority, contractors can be brought in without a lengthy recruiting and hiring process. Poorly performing contractors can be replaced more easily than employees.

[g] The Personnel Cabinet pointed out that this process would need to be handled carefully to ensure statutory compliance.

Recommendation 2.2

Recommendation 2.2

The Personnel Cabinet, in consultation with the Finance and Administration Cabinet and other agencies, should conduct a classification and compensation study assessing the overall cost of equalizing IT compensation with private industry compared to the cost of continuing to use IT contractors, taking into account such factors as contractor flexibility.

Capital Procurement And Project Management

Experts assert that improvements in procurement and project management could save state funds and increase the efficiency of the state's technology systems.

After the General Assembly reviews the capital plan and the branch budget requests and appropriates capital IT funding for business applications, agencies have to carry out the projects. Procurement and project management are the two steps required to complete the process. Program Review staff were unable to find systematic comparative research evaluating different methods of IT procurement and project management. However, experts assert that improvements in these areas could save state funds and increase the efficiency of the state's technology systems. The Finance and Administration Cabinet and COT agree and have taken steps to improve IT procurement and project management.

Several paths are available, including

- purchasing a commercial system and using it off the shelf without modification,
- purchasing a commercial system and customizing it to meet agency needs, or
- designing and building a custom application.

Purchasing off the shelf and for customization would also require a request for bids or request for proposals (RFP). Designing and building a custom application could be done with agency staff or a vendor, and selecting a vendor would require an RFP.

Activities to ensure a successful procurement include

- reviewing all relevant agency business processes to determine whether they should be automated as is, improved before implementing a technology solution, or modified to fit an existing solution;
- deciding whether to buy or build a solution;
- if buying a product or hiring a vendor, writing the request for bids or proposals so that it
  - accurately represents the agency's business requirements,

  - discourages vendors from bidding below cost in order to undercut competitors, and
  - protects the state against vendor performance deficiencies; and
- managing the project so that the application meets business requirements on schedule and within budget.

All of these options require the agency to identify and document its business needs. An agency's business process represents how the agency does its work and delivers its programs and services. It is a good practice for agencies to review and improve their business processes periodically as well as at any time an agency wishes to apply technology to assist with or automate any of its procedures. Currently, COT is working with agencies to review and document their business processes as part of the infrastructure consolidation.

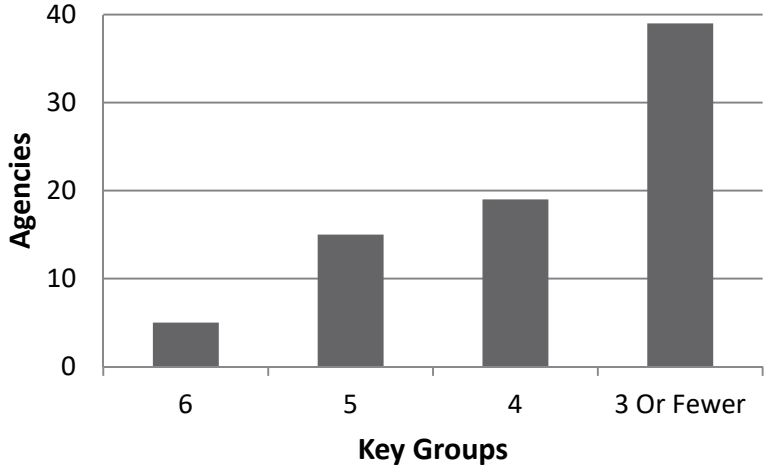
Nearly 63 percent of agencies reported that they reviewed and revised business processes only when needed or when technology changes were being made.

More than 37 percent of agencies responding to the Program Review staff technical survey reported that they reviewed and revised their business processes on a regular basis, and most of those coordinated their reviews with planning for technology. The rest, nearly 63 percent, reviewed and revised business processes only when needed or when technology changes were being made. These agencies would probably benefit from a routine review process.

Program Review staff identified six business groups that ideally should be involved in business process reviews.

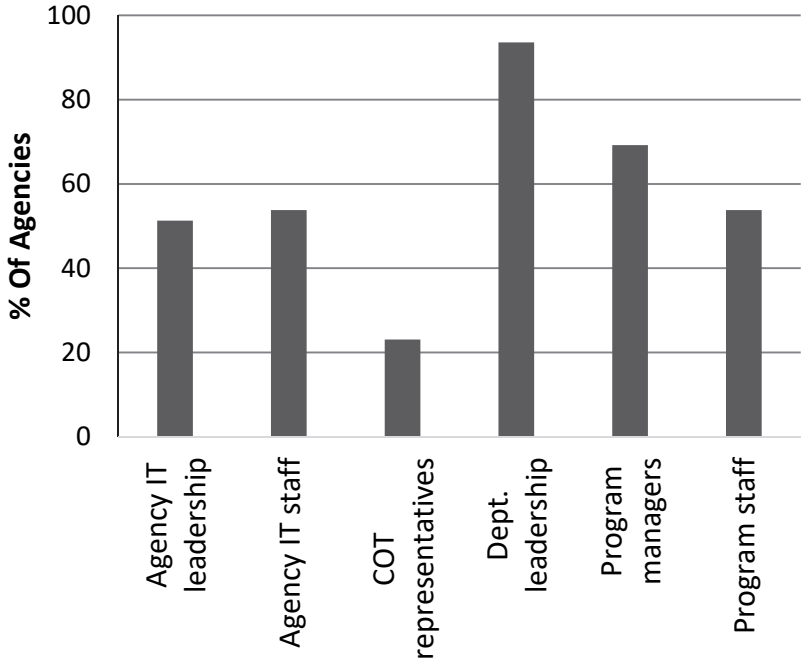
Program Review staff identified six business groups that ideally should be involved in business process reviews. Figure 2.B shows that only 5 of 78 agencies included all six key groups in their business process planning. Agencies would probably benefit from including all these groups, especially COT representatives, in all their business process reviews. Figure 2.C shows that department leadership and agency program managers were most often involved. IT leaders and staff were included at a little more than half of the agencies. COT representatives, who are responsible for coordinating technology among agencies, were reported by just more than 20 percent of agencies.

Figure 2.B
Number Of Key Groups Included
In Agency Business Process Planning



Note: Number of respondents: 78.
Source: Program Review staff technical survey of state agencies.

Figure 2.C
Key Groups Involved In Business Process Planning



Note: Number of respondents: 78.
Source: Program Review staff technical survey of state agencies.

Applying technology to business processes requires agencies to consider whether their policies and procedures could be improved prior to automating them and whether there are commercial

business applications that come close enough to fitting those business processes. Commercial applications require customization to meet an agency's business needs or require the agency to modify its business processes to fit the way the technology solution works, so an agency might decide it is better to build its own solution.

Kentucky has experienced some significant cost overruns and delays with IT project development and implementation.

Any time an agency implements a technology solution, there is a chance it may fail to meet the agency's needs at the expected price and timetable. As pointed out by the PTI report and the Auditor of Public Accounts, Kentucky has experienced some significant cost overruns and delays. These might have occurred because of unrealistically low bids, overextended vendors, or inadequately aggressive project management.

This study's technical survey asked agencies to describe factors that led to the success of business applications or were missing from poorly performing applications. There was no consensus, but the most frequently mentioned factors were ensuring stakeholder input, having a good application design, and paying attention to business processes. Two of these are elements of good project management.

Active Procurement Management

Agencies do not always involve COT from the point of reviewing business processes and writing the procurement request and request for proposals, but according to COT, more agencies are doing so.

The Commonwealth Office of Technology can assist agencies in the procurement process. As noted, agencies do not always involve COT from the point of reviewing business processes and writing the procurement request and RFP, but according to COT, more agencies are doing so.[31] Agencies may also receive advice and assistance on IT procurements from the Office of Procurement Services in the Finance and Administration Cabinet.[32]

After technology RFPs have been drafted, the Office of Procurement Services has been forwarding them to COT for review of reasonableness, enterprise standards, security, and other factors. COT assists agencies with developing a better RFP or identifying alternatives to procurement.

Program Review staff recommend that COT use its authority to require agencies to involve that office and the Office of Procurement Services from the earliest stages of procurement and project design.

Recommendation 2.3

Recommendation 2.3

The Finance and Administration Cabinet and the Commonwealth Office of Technology (COT) should ensure that all agencies consult with COT at the earliest stages of considering new or updated business applications and that all agencies develop their procurement and project designs with input from COT and the cabinet's Office of Procurement Services.

Active Project Management

After capital IT projects have been funded, the Capital Projects and Bond Oversight Committee receives quarterly reports listing the status of IT projects. The committee generally does not place capital IT projects on its agenda and does not oversee the progress of IT projects, reviewing only requests for funding increases or transfers of funds to a project (KRS 45.760(6)). Rarely, an IT project might be funded by bonds; the issuance of bonds for an IT project would have to come before the committee.

Expert opinion suggests that IT projects require active and assertive management by the agency that will use the application.

Expert opinion suggests that IT projects require active and assertive management by the agency that will use the application.[33] Especially for larger and higher-risk projects, COT recommends that agencies use a certified or experienced project manager and that they include the full cost of project management in their project budgets. The PTI report recommended that COT actively monitor and measure progress on all capital IT projects, and COT indicated that it is looking at ways to provide additional project oversight. So far, however, no firm requirements are placed on project management.

Recommendation 2.4

Recommendation 2.4

The Finance and Administration Cabinet and the Commonwealth Office of Technology (COT), at their discretion, should ensure that all agencies employ certified or experienced project managers for capital IT projects. COT should actively review and measure the progress of such projects and maintain records to develop evidence-based best management practices.

Information Access And Security

Kentucky has taken steps in the past few years to ensure that the public should have access to relevant information about the operation of state and local governments.

Kentucky has taken steps in the past few years to ensure that the public should have access to relevant information about the operation of state and local governments. Executive order EO 2008-0508 established the E-Transparency Task Force and initiated the Kentucky Open Door portal. In the 2011 Regular Session, the General Assembly enacted Senate Bill 7 to require all branches of government and the public universities to display their expenditures and budgets on the Web. In addition, Senate Bill 88 of the 2010 Regular Session required local government entities to display financial information on a public website.

All modern IT systems are vulnerable to accidents and attacks, so procedures are needed to handle data breaches.

State agencies also hold sensitive private information about many people, such as controlled substance prescriptions, health care claims, electronic medical records, and student records. This information is available over the Internet to authorized personnel and, in many cases, to the person whose record it is; and the information must be protected from breaches by accidental exposure as well as by theft. However, all modern IT systems are vulnerable to accidents and attacks, so procedures are needed to handle data breaches. Data theft can occur by hacking Web portals but also through other avenues, such as physically accessing IT equipment or tricking state employees into providing passwords or installing computer viruses.

Breach Notification Law

In the 2014 Regular Session, the General Assembly passed House Bill 5 to address breach notifications effective January 1, 2015.

Until this year, Kentucky was one of four states without an information technology breach notification law.[h] [34] Such laws require alerting entities and individuals when personal information has been electronically breached. In the 2014 Regular Session, the General Assembly passed House Bill 5 to address breach notifications effective January 1, 2015.[i]

The new legislation relates to the security of personal information held by public agencies and is based on Maryland's breach notification law, in turn modeled on California's, which was the first state breach statute and became a national model.[35] HB 5 applies to executive branch and local government agencies, public schools and universities, and persons (non-affiliated third parties) contracting with these entities. The legislative and judicial

[h] The National Conference of State Legislatures reports that the three remaining states without breach notification laws are Alabama, New Mexico, and South Dakota.
[i] HB 5 will be codified in KRS 61.931 to 61.934 and 42.726.

branches are required to implement and maintain reasonable security and breach procedures consistent with those mandated for other entities.

HB 5 requires subject entities to safeguard personal data, notify specified authorities if breaches occur, and establish reasonable security and breach investigation procedures.

The law requires subject entities to safeguard personal data, notify specified authorities if breaches occur, and establish reasonable security and breach investigation procedures. If the agency determines misuse of personal information has occurred or is likely to occur, then it must also give notice to individuals whose data has been breached and, for larger breaches, must inform consumer credit reporting agencies. An overview of various entity-specific notification requirements appears in Table 2.8. Appendix F has further details.

Table 2.8
Overview Of 2014 HB 5 Security Breach Notification Requirements
Effective January 1, 2015

Type Of Entity Breached	Contact Within 72 Hours Of Awareness Of Breach	Contact By 48 Hours After Investigation	Notify By 35 Days After Investigation
Executive branch, local government, public school, or public university	State Police commissioner, auditor of public accounts, and attorney general	All officials who were notified at 72 hours and KDLA commissioner	All persons affected by the security breach and consumer credit reporting agencies*
• Executive branch also contacts • Local governments also contact • Public schools also contact • Public universities also contact	FAC secretary DLG commissioner KDE commissioner CPE president		

Note: FAC = Finance and Administration Cabinet; DLG = Department for Local Government; KDE = Kentucky Department of Education; CPE = Council on Postsecondary Education; KDLA = Kentucky Department for Libraries and Archives.
* Consumer credit reporting agencies listed with the Office of the Attorney General are notified only if the number of affected individuals exceeds 1,000.
Source: Program Review staff interpretation of HB 5.

The effects of HB 5 cannot be fully analyzed because the legislation is not effective until January 2015.

The effects of HB 5's statutory changes cannot be fully analyzed because the legislation is not effective until January 2015. COT has begun using the HB 5 breach notification protocol and has found that it improves the process. Also, COT is drafting regulations, creating the appropriate forms, and updating incident response policies and procedures as directed by the statute.[36] COT security liaisons are working with agencies to assist with HB 5 implementation requirements.[37] Highlighting the importance of incident response preparedness, COT recommends that agency

implementation plans include developing communication channels among business stakeholders, public relations, communications, and legal staff, and establishing a point of contact for all security breach incidents.[38]

Personal Information Security And Access

Security of personal information can be threatened by malware, insufficient password protection, employee theft, or accidental dissemination of confidential information.

In the Program Review staff technical survey, state agencies considered the public's access to information as important and rated themselves highly at providing it. Accordingly, if agencies are making information more accessible, there is a need for greater vigilance to protect personal and proprietary information. There are multiple ways this information can be compromised in information technology systems. Compromising events can consist of

- malicious software (malware),
- insufficient password protection,
- employee theft, [39] and
- inadvertent exposure of personally identifying confidential information.[40]

Malware generally tries to take control of a computer to cause malfunction or retrieve sensitive or confidential data. Computers can be infected with malware through email messages, files, or websites.[41] Insufficient password protection can include instances in which no password is employed or the password is weak enough to permit unauthorized users to discover it by trial and error.[42] Employees or contractors might have various reasons to steal information they have or can obtain access to. Personally identifying information could be exposed if an employee mistakenly uploaded confidential information to a website or failed to secure a desktop computer while away from the desk. These lapses can result in liability for the releasing entity and identity theft risk to the individuals whose information is leaked.[43]

Though Kentucky state government has not reported massive security breaches like those suffered by major retailers and banks, the Auditor of Public Accounts has documented multiple and repeated security vulnerabilities.

Though Kentucky state government has not reported massive security breaches like those suffered by major retailers and banks, the Auditor of Public Accounts has reported multiple and repeated security vulnerabilities at state agencies. The 2013 auditor's report on cyber security highlighted vulnerabilities discovered through IT audits of 11 state agencies. The report listed two limited exposures of personal information since 2012 that resulted from agency errors and were corrected shortly after they occurred.[44]

The auditor stated that one purpose of HB 5 was to incentivize government entities to do more to protect the personal confidential data they maintain.[45] Several of the auditor's recommendations focused on agencies' doing better at following existing COT security protocols.[46] COT's "enterprise policies articulate the rules and regulations of state government regarding information technology."[47] Of the 22 policies listed, 15 directly relate to system or data security issues.

Program Review Technical Survey Security Results

Public Access To Information. Twelve agencies addressed public access to information. Of those, four referred to information transparency issues in general. For example, one respondent stated, "all in-house developed applications provide a subset of data that provides data to public, but does not include personal data." Four agencies mentioned adhering to Open Records Act requirements.

Ten survey respondents listed occurrences of security breach incidents that would have required reporting under HB 5.

Security Breaches Reportable Under HB 5. Ten survey respondents listed occurrences of security breach incidents that would have required reporting under HB 5. Responses varied in degree of detail. Five of the agencies reported that files were potentially exposed, laptop computers were stolen but had no personally identifiable information on them, hacking attempts to a website administrator's account were unsuccessful, or personal information was exposed but the agency believed no compromise or misuse of personal information occurred. Four agencies did not specify whether exposure of personally identifying information resulted in compromised or misused data, but one of them reported notifying the affected individual of the breach. One agency did not provide details about the breach.

Some of the incidents reported on the survey were reported by the auditor as having security vulnerabilities.

Three of the agencies that reported breaches on the survey also appeared in the auditor's cyber security report as having security vulnerabilities. Staff could not determine whether the breaches were related to these known vulnerabilities.

IT Security Tool Ratings. Agencies were asked to rate their hardware and software security tools from the Internet gateway to the local network to individual devices in terms of effectiveness, efficiency, ease of use, reliability, being up to date, user satisfaction, and technical support. The results appear in Table 2.9. Low ratings were given by 3 percent or fewer of the agencies and are not shown.

Table 2.9
Agency Ratings Of IT Security Tools

Attribute	% Of High And Moderate Ratings	% Of High Ratings
Effectiveness	97.3%	75.7%
Efficiency	97.3	66.2
Ease of use	98.6	56.8
Reliability	98.6	74.3
Up to date	97.3	64.9
User satisfaction	97.3	64.9
Technical support	97.3	59.5

Note: Number of respondents: 74. Ratings of high and very high were combined as high. Low ratings were given by 3 percent or fewer of the agencies and are not shown.
Source: Program Review staff technical survey of state agencies.

With nearly one-fourth of agencies rating effectiveness and reliability as moderate or lower, there is a question whether moderately effective security tools are adequate.

Agencies rated all IT security tool attributes high to very high more than half of the time, with effectiveness and reliability the most highly rated. When the moderate ratings were added, each attribute neared 100 percent. However, nearly a quarter of agencies rated effectiveness and reliability as moderate or lower, raising the question whether moderately effective security tools are adequate.

Agencies were asked to describe security measures or policies that are designed to ensure that appropriate public access to information is maximized while maintaining data security and meeting privacy concerns.

Agency IT Security Policies And Measures. The technical survey asked agencies to describe security measures or policies that are designed to ensure that appropriate public access to information is maximized while maintaining data security and meeting privacy concerns. Answers from 58 respondents varied in detail; some responses listed specific software systems and training, while others were more general. The general answers included: all security handled by agency, policies in place to protect sensitive data, unknown, or under development. Of the 26 who gave detailed answers, 15 referenced COT, either as handling the security for the agency, or as the source of policies and directives that the agency followed. Four respondents referred to outside vendor security measures.

The survey also asked respondents to indicate whether well-performing agency business applications excelled at security; respondents indicated that more than 71 percent of those applications did. For applications that were poorly performing, less than 7 percent were reported to have problems with security.

Agency Security Awareness

Attacks on state government IT systems are increasing in number and sophistication.

Attacks on IT systems are increasing in number and sophistication, but a 2014 national study found a disconnect between perceived security risks by state agency security officers and management staff. Only 24.5 percent of security officers stated that they were very confident they could protect agencies, but 60 percent of state officials stated that they were very confident in their protection against such attacks.[48]

On the Program Review staff technical survey, three agencies indicated that their systems were safe because there was no public access other than their websites; however, websites are vulnerable to hacking that could expose login credentials and create other security risks. These responses and 15 others of none, no comment, or not applicable, suggest that some agency staff are not aware of all security risks. Beyond website vulnerability, agencies need to educate all staff thoroughly about their role in protecting systems and information by physically securing their workstations, avoiding phone call security scams, treating all emails with care, securing all copies of sensitive information, and taking other appropriate precautions.

Some agencies, particularly those with federal security obligations, have compliance officers. COT publishes enterprise security standards, offers security liaison services to assist agencies, and provides a security training and awareness video for all agencies to use.[49]

Recommendation 2.5

Recommendation 2.5

The Commonwealth Office of Technology should ensure that all agencies prioritize technology security initiatives and maintain continuing communication and training for their staff on evolving threats and best practices to safeguard sensitive information in their keeping.

Conclusion

There are other factors affecting the appropriateness or usability of technology. This study, with a broad focus on the current status of technology, did not address all usability factors in detail. COT and all other agencies should work together to identify and address all barriers to the cost-effective and productive use of technology.

Chapter 3

Information Technology Assets

There is no previous information on appropriateness to compare directly with the results of this report, but these results could serve as a benchmark for future progress.

This chapter provides agency and Program Review staff perspectives on technology. It is not possible to say that state government technology is more or less appropriate than it was, because there is no previous information for direct comparison. The results presented here could serve as a benchmark to measure future progress.

Infrastructure Assets

All infrastructure types were rated from 3.58 to 3.78 out of 5, which is between moderate and high but closer to high. Desktops and workstations scored highest, followed by Internet access, local networks and servers, and communications, but the differences were not great.

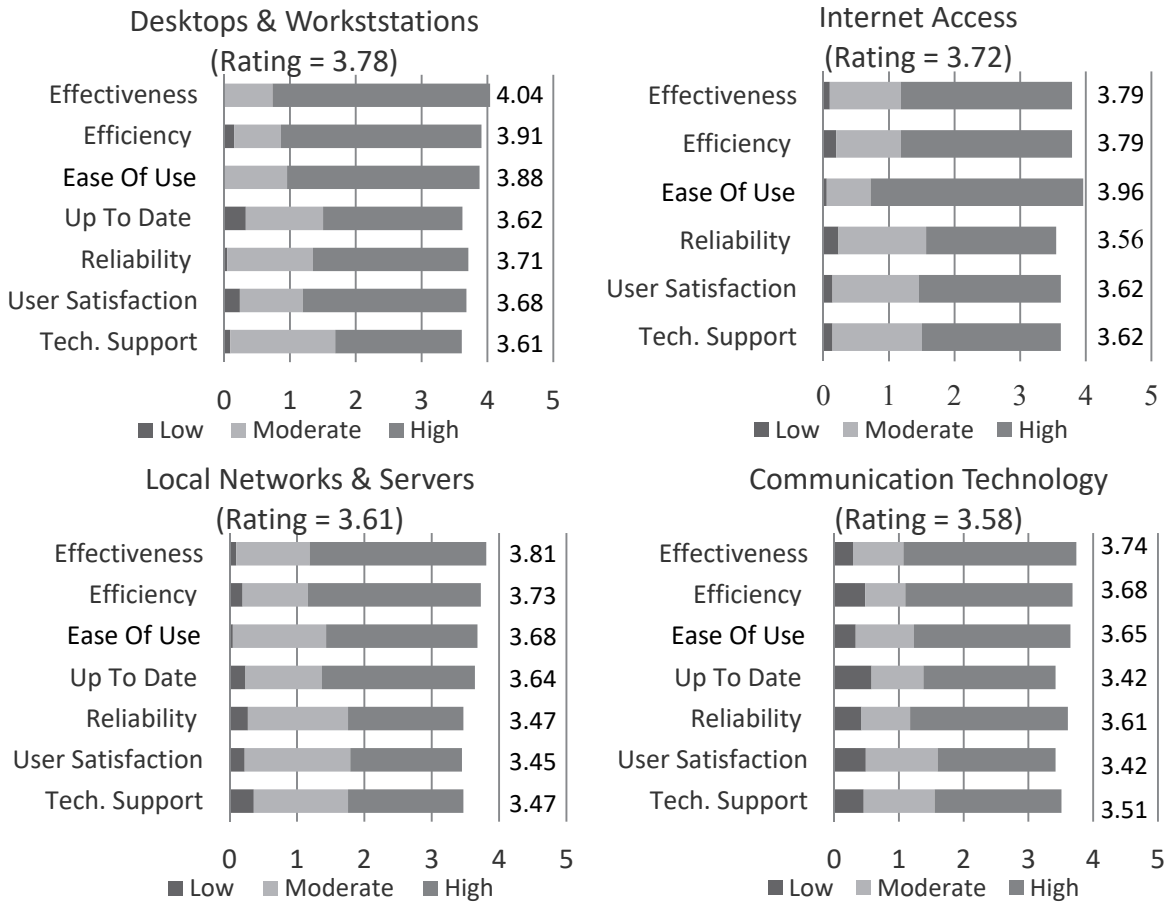
Program Review staff surveys asked agencies to evaluate the performance of their technology infrastructure. The assets were rated in several areas on a scale of 1 to 5, with 1 being very low; 2, low; 3, moderate; 4, high; and 5, very high. Figure 3.A shows the ratings given to technology infrastructure asset types in each area: effectiveness, efficiency, ease of use, being up to date, reliability, user satisfaction, and technical support.[a] An overall rating was calculated for each asset type and is shown below the chart headings. All infrastructure types were rated from 3.58 to 3.78, which is between moderate and high but closer to high, but the differences were not large.

Desktops and workstations scored highest. On individual scales, their effectiveness score of 4.04 (high) was the best among all the types of infrastructure in all areas. Their other scores ranged from 3.61 to 3.91, between moderate and high but closer to high.

Internet access ratings ranged from 3.56 to 3.96, between moderate and high but closer to high. Local networks and server ratings ranged from 3.45 to 3.81, between moderate and high. Ratings were closest to high for effectiveness (3.81) and efficiency (3.73). Ratings for communication technology ranged from 3.42 to 3.74, between moderate and high. Being up to date (3.42) and user satisfaction (3.42) were rated closer to moderate.

[a] Being up to date was not rated for Internet access.

Figure 3.A
Agency Technical Ratings Of Infrastructure



Note: Number of respondents: 77. Bar segments show the relative portion of agencies responding with low (very low and low combined), moderate, or high (high and very high combined) ratings. The numbers on the right show the average rating on a 5-point scale.
Source: Program Review staff technical survey of state agencies.

Enterprise Business Applications

The surveys asked agencies to evaluate the statewide accounting system and the statewide human resources system, which Program Review staff also examined. The following sections describe the survey and examination results.

Statewide Accounting System

EMARS is a CGI product, a much-enhanced version of the original Management Administrative and Reporting System.

The statewide accounting system, eMARS, is a much-enhanced version of the original Management Administrative and Reporting System. It is a customized version of the CGI Advantage enterprise

resource planning product.[b] It supports functions such as procurement, purchasing, payables, receivables, revenue, general ledger, fixed assets, and budget management.

The original application cost approximately $30 million, and the eMARS upgrade cost approximately $10 million. EMARS costs almost $7.7 million per year to operate, of which agencies using it contribute almost $3.8 million.

History And Costs. Development of the original application began in 1998, and the system went live in July 1999 at a cost of approximately $30 million. In April 2004, development of the enhanced application began, and eMARS went live in July 2006. The cost of eMARS was approximately $10 million.[50]

The operating cost of eMARS is almost $7.7 million per year, including $1.8 million for the maintenance contract with four to six vendor support staff on site.[51] State agencies using eMARS contribute almost $3.8 million toward this cost.[52]

Including Kentucky, 22 states were using CGI Advantage as of August 2014, and another state was in the implementation process. Because of some customization, there is additional cost to Kentucky whenever a new version of the application comes out. However, CGI has a product steering committee run by state and local government users that recommends features to be added to the baseline product. Finance and Administration Cabinet (FAC) officials asserted that the customization cost is not large because CGI has incorporated several Kentucky features into its product. Features that remain strictly Kentucky customizations include the proof of necessity document (PON2) for personal service contracts and the purchase justification document (EO1) that is required under executive order EO 2008-0011. [53]

The state also operates a data warehouse comprising primarily eMARS information with some human resources and other information. Agencies are now required to pay an annual fee of $300 per eMARS user for the data warehouse, but the Finance and Administration Cabinet (FAC) reported that this is less than agencies used to pay.

In addition to eMARS, the state operates a data warehouse and reporting toolkit.[c] The data warehouse comprises primarily eMARS information along with some human resources information from KHRIS and some information from other systems. Agencies use the data warehouse to create management reports and to import data into their own business applications. Beginning in FY 2015, agencies are expected to pay $300 for each eMARS user toward the cost of the data warehouse and reporting tools, or a total of more than $1.4 million. However, FAC officials noted that the state as a whole was paying $700,000 less for the new statewide license than individual agencies previously paid for individual licenses, and they expect further savings as use of the reporting tools increases.[54]

[b] Originally, the product was AMS Advantage. AMS was acquired by CGI.
[c] This system uses the SAP Business Objects product.

FAC officials asserted an indefinite lifetime and good reliability.

Application Lifetime And Reliability. FAC officials asserted that eMARS could continue indefinitely if Kentucky implemented product upgrades in a timely manner and if the industry continued to support the Web platform for such applications.[55]

FAC officials reported that there is no official tracking of eMARS response times but that there have been no problems with response times. They also were unaware of any unscheduled system downtime other than an occasional hardware failure.[56]

With eMARS, Kentucky has maintained clean financial audits. Kentucky has also contributed features to the commercial product on which eMARS is based.

Accomplishments. According to FAC officials, Kentucky has received a clean audit of financial statements since 1987, and since 1988, the Government Finance Officers Association has given Kentucky a certificate of achievement for excellence in financial reporting.[57] These achievements included the MARS and eMARS implementations.

Via eMARS, Kentucky implemented a check verification system with its bank to reduce fraud from alteration or forging of state checks. Kentucky also implemented an eMARS feature that holds payments when the payee has debts to the state or federal government; CGI is incorporating this feature into its baseline product.

FAC has only offered introductory training for some time. The cabinet plans to offer streamlined training after the current eMARS upgrade is complete. Manuals are being updated.

Training And Documentation. Several agencies reported that there had been no training for eMARS users for some time. FAC officials concurred, stating that only an introductory training had been held in the previous 6 months. As of August 2014, training would have been suspended in any case in order to implement an upcoming eMARS upgrade. FAC is planning to create online tutorials and implement an online webinar approach to live training. Meanwhile, there are online manuals, a help desk, and user groups to assist agencies.[58]

The eMARS manuals were removed from FAC's public website because they contained proprietary information, but most are available to eMARS users via the data warehouse.[59] FAC officials acknowledged that a few manuals were missing from the website and data warehouse. Some were subsequently posted or were in the process of being updated and should be posted soon. A significant deficiency noted by Program Review staff was the absence of clear explanations of the use of object codes and other accounting codes. FAC officials stated that a document was under development to provide instructions on the use of object codes.[d] [60]

[d] As explained elsewhere, an object code is used on payments, adjustments, and other documents to indicate the purpose for which funds were used.

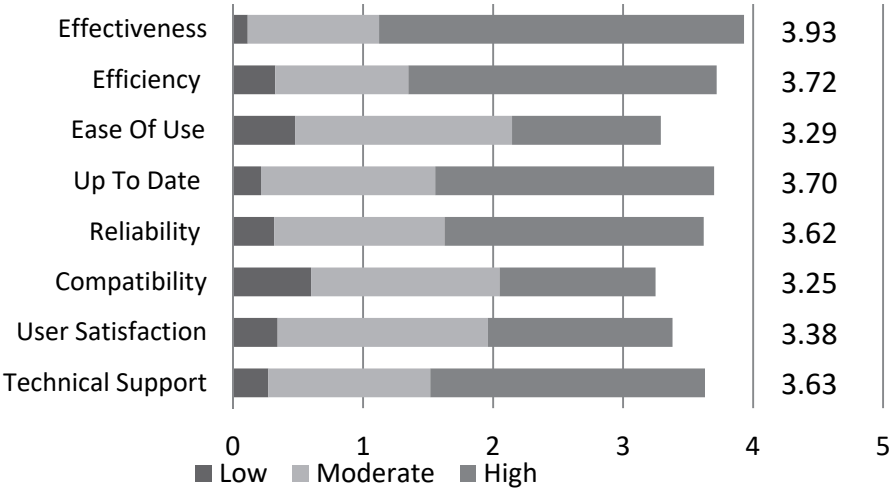
More than half of agencies stated that eMARS was consistent with their business needs, and 91 percent said eMARS was of high or very high importance.

Agency Ratings. On the Program Review staff policy survey, more than 57 percent of respondents agreed that eMARS was consistent with agency business needs, and almost 19 percent disagreed. The technical survey asked agencies to rate eMARS on several scales. On importance to the agency's business process, 91 percent of agencies said eMARS was of high or very high importance.

On other scales, eMARS was rated between moderate and high. Effectiveness was rated closer to high, and compatibility with other systems was rated closer to moderate.

Figure 3.B shows the other technical survey results. None of the factors was rated over 4 on the 5-point scale. EMARS was rated more highly at effectiveness in meeting business needs, efficiency, and being up to date. Lower ratings were given for compatibility with other systems, ease of use, and user satisfaction.

Figure 3.B
Agency Ratings Of EMARS



Note: Number of respondents: 65 to 70. The number of responses to each eMARS evaluation criterion can vary because respondents were offered the option of identifying a criterion as not applicable. Bar segments show the relative portion of agencies responding with low (very low and low combined), moderate, or high (high and very high combined) ratings. The numbers on the right show the average rating on a 5-point scale.
Source: Program Review staff technical survey of state agencies.

Several agencies reported difficulties using eMARS, which they supplement with manual or electronic procedures, sometimes requiring significant additional work.

EMARS Deficiencies. Program Review staff noted some eMARS deficiencies during this and previous studies. Agencies also reported difficulties for which they compensate using a variety of manual or electronic procedures, some of which require significant additional work by agency staff. Other deficiencies relate to eMARS limitations and difficulty auditing the information in the system.

Supplemental Procedures And Applications. Several agencies described procedures for transferring information on paper alongside the electronic process in eMARS. These included procurement documents, contract award documents, invoices for payment, and inventory. Other agencies have created procedures to transfer electronic information, typically scanned images of paper documents, alongside the eMARS process. Appendix G lists some examples of supplemental business applications.

Many agencies use Excel or a similar tool to store and manipulate eMARS information or to track an eMARS process in greater detail. For example, the Department for Behavioral Health, Developmental and Intellectual Disabilities reported using Excel to track and manage its contracting process. The Department of Education reported using Excel to track contracts and payments.

Many agencies have built or purchased supplemental or parallel procurement, payment, and inventory applications. Common reasons for going outside eMARS included

- limiting the number of eMARS users, in part for security reasons or cost;
- wanting email reminders to individuals who need to take some action related to an ongoing process;
- tracking inventory, which is an eMARS feature not currently available to agencies;
- needing more detailed information than eMARS supports; and
- wanting a different document approval sequence than eMARS supports.

Most supplemental applications require staff to enter duplicate information and carry out duplicate procedures. These could be made more efficient if agency applications were allowed to interact with eMARS.

Most of the supplemental applications require agency staff to enter some of the same information in both the application and eMARS and to carry out procedures such as approvals in both systems. When Program Review staff looked at such applications in detail, it appeared that a connection could be built with eMARS to permit the agency application to update eMARS automatically and to retrieve information from eMARS to update the agency application's data.

There are two methods that eMARS uses to interact with other systems. The first could be called a file-based interface, and the second is a Web service interface.

The file-based interface permits another application to create an information file and upload it to a special location. Upon approval from FAC, eMARS would read the file and perform the updates indicated. This would happen on a schedule agreed to by the agency and FAC, probably at night. In the other direction, eMARS information is extracted every night and stored in the data warehouse. Agencies may view or extract the information from the data warehouse and use it in their own applications. The file-based interface, therefore, is always delayed, usually by a day or longer, and typically requires staff action.

The Web service interface permits another application to send and receive transactions with eMARS in real time. For example, an employee at the Cabinet for Health and Family Services might enter an order for furniture into the cabinet's purchase tracking application. The application might immediately send eMARS the necessary information to create a purchase order and submit it in eMARS. The application might request and receive information such as the purchase order number and approval status, store that information in its database, and send an email to the manager who needed to approve the order in eMARS. The application might continue to query eMARS from time to time to determine when the order was approved and then send an email to the vendor with the purchase order information.

FAC strictly limits agencies' use of eMARS interfaces. It would be beneficial to discover the full extent of agencies' unmet business needs and determine how to meet them.

At this time, however, FAC strictly limits the use of the file interface and does not permit agencies to use the Web service interface. Likely reasons include security, data integrity, and the load on eMARS during business hours.[61]

FAC officials reported that they maintain a list of eMARS issues and enhancement requests, which they review weekly. However, it appears that the full extent of other agencies' business needs could be solicited and reviewed at the enterprise level for possible solutions. The Commonwealth Office of Technology has the mandate to coordinate technology in state government; it could work with the Office of the Controller and with agencies using eMARS to proactively identify and address those business needs that result in supplemental procedures and applications.

Recommendation 3.1

Recommendation 3.1

The Commonwealth Office of Technology should work with the Office of the Controller and the agencies that use the statewide accounting system to elicit all the supplemental procedures and business applications that agencies use to meet their accounting needs. The offices should identify the reasons agencies supplement the accounting system and should develop solutions so that agencies may use the accounting system more efficiently.

Three deficiencies relate to inadequate functionality: There is no link between a contract and renewals, vendor invoices are not in the system, and master agreement balances are incomplete.

Inadequate Functionality. Several eMARS deficiencies were noted that arose from functionality that the application does not support. Three are noted here.

EMARS does not provide a link between a contract and its renewals. A contract manager or auditor must search manually through contract information in eMARS for indications that a contract was renewed or was a renewal of a prior contract and then must manually look up the other contract. There are fields on contracts labeled "Replaces Award" and "Replaced By Award," but there is no automated link between contracts when these fields are used, and they are usually blank.[e] Sometimes there is a renewal notation in comments or attachments to the contract.[f]

Vendor invoices are not stored in eMARS. Program Review staff asked three large agencies how they managed invoices in order to ensure proper justification for payments. The agencies all reported that they had procedures to ensure that a hard copy or scanned image of an invoice is routed along with each payment to the officials who approve the payment.

It is not possible to determine the amounts actually spent on master agreements. Some of the difficulty arises from the fact that master agreements are merely price contracts that promise a long-term fixed price for the delivery of certain goods or services. For most such agreements, any state or local government agency may place orders simply by contacting the vendor and mentioning the master agreement number. If the agency created a delivery order in eMARS, the amount paid would be applied to the contract balance,

[e] EMARS has a feature called "Lifecycle Inquiry," or LINQ, that will find other documents related to a particular document. LINQ does not find contract renewals or prior contracts of a renewed contract.

[f] Personal service contract documents, or PON2, contain a section called "Proof of Necessity" that includes a field called "Type of Award," but the Program Review staff study of such contracts showed that it is usually set incorrectly by agencies.

but many orders are made without using the delivery order process. Payments for those orders do not appear on the contract, even if the payments include a reference to the contract. One agency places most of its orders in this manner, and its payments do not even include a contract reference for auditing purposes. In addition, most procurement card purchases from master agreements do not update the contract's balance.

FAC has made some efforts toward capturing more of the payments on master agreements. There is now a report that combines amounts from all payments that make reference to the master agreement, even though they do not appear in the contract's balance in eMARS. Under some circumstances, procurement card purchases now update contract balances. It would be impractical and probably unnecessary to find out how much local governments are purchasing from state master agreements. However, in order to determine the effectiveness of these price contracts, it would be helpful for FAC and CGI to consider ways to further improve the capture of purchases by state agencies.

Frequently, information in eMARS is incorrect or missing. Some agencies are trying to meet a business need that eMARS does not support, but in many cases agency staff appear to need better instruction.

Deficiencies From Incorrect Or Missing Information. Program Review staff found frequent instances of incorrect or missing information that was entered into eMARS. Chapter 4 includes a detailed description of questionable uses of object codes, which are codes that indicate the purpose of a payment or adjustment. Other examples are payments that referenced the wrong contract and procurements that did not include proposal evaluations for all responsive and responsible vendors.[62]

Some agencies use fields in ways that were not intended. For example, an agency places a special code in the invoice number field for travel vouchers so that it can detect duplicate travel vouchers. This practice was developed because eMARS does not provide a way to identify a trip, but the practice itself is subject to error and creates meaningless vendor invoice records in eMARS.

Incorrect information appears to occur for two reasons. Sometimes agencies are attempting to meet a business need that eMARS does not support. However, in many cases agency staff appear to need better instruction on how to enter information properly. FAC could periodically review a sample of eMARS transactions to identify erroneous or missing information, determine likely reasons, and work with the agencies to improve their use of the system.

The data warehouse reporting tool, not part of eMARS, has a security deficiency that could be corrected.

Security Deficiency. Program Review and agency staff found a deficiency with the data warehouse reporting tool, infoAdvantage, which is not part of eMARS but is a CGI product. InfoAdvantage does not work correctly with the current version of Java.[g] Earlier Java versions are more vulnerable to hacking, which creates a security risk. However, infoAdvantage has an "interactive" report creation and edit setting that does not require Java and, therefore, is more secure. FAC might set infoAdvantage to use the interactive setting by default or instruct all agencies and users to change their settings to interactive.

Statewide Human Resource System

The Kentucky Human Resource Information System (KHRIS) is the state's personnel system. For payroll, it interfaces with eMARS.

The Kentucky Human Resource Information System (KHRIS) is the state's personnel system. KHRIS maintains personnel data, organizational data, timekeeping, payroll, and benefits for commonwealth employees. For payroll, KHRIS interfaces with the statewide accounting system, eMARS.

Multiple elements affect how KHRIS processes payroll. Tax regulations at the local, state, and federal levels must be accounted for as they apply to each employee. The Personnel Cabinet relies on an outside vendor to keep track of tax regulation changes. Changes in health care requirements necessitate adjustments to the benefits section of KHRIS. For example, KHRIS must accommodate the compliance requirements contained in the Affordable Care Act.

From 1982 to 2011, the Uniform Personnel and Payroll System functioned as the state's personnel system.

History And Costs. The Uniform Personnel and Payroll System (UPPS) functioned as the state's personnel system for nearly 30 years until 2011. Initially purchased from McCormack and Dodge, UPPS ceased to receive vendor support 2 years after its implementation. COT supported UPPS until the late 1990s. After 2000, COT no longer supported UPPS, so the Personnel Cabinet relied on retired COT personnel for support and maintenance. Heavily customized and operating beyond its capacity, UPPS had difficulty accommodating changes in payroll tax structuring and other statutory changes. Field lengths and tables reached a maximum and could no longer receive additional data. Personnel Cabinet officials stated that extensive customization and coding limitations continually created issues when processing payroll, and that UPPS "had to be hand held during most runs."[63]

[g] Java is a programming language used on a wide variety of computers and other devices.

UPPS was a COBOL-based mainframe application that required data to be reformatted before it could be shared with other systems. According to Personnel Cabinet officials, the COBOL programming used by UPPS impeded system integration.

In 2007, IBM began customizing the SAP human resources product. The contract was canceled in 2009, and SAP completed the project in 2011 with core functionality but without some planned features.

Effective March 2007, IBM contracted to develop a replacement system by customizing the SAP commercial human resources product. After a contract extension and project delays, the contract with IBM was canceled in June 2009. The Personnel Cabinet assumed responsibility for project management, and SAP carried out the KHRIS implementation. Cabinet staff stated that implementation with SAP went smoothly. KHRIS went live in April 2011 with core functionality but without some features from the original project plan.

KHRIS cost approximately $50.5 million to implement, twice the original estimate. It costs nearly $8 million a year to operate, which is paid by agencies that use it.

The approximate cost to develop and implement KHRIS was $50.5 million. The final cost was more than twice the original contract amount. The approximate cost to operate KHRIS is nearly $8 million per year. The Personnel Cabinet charges for services provided to state agencies to cover this cost.

KHRIS unified 25 distinct systems, improved processes, and saved costs.

Accomplishments. KHRIS replaced approximately 25 distinct personnel, payroll, and timekeeping systems when it went live in 2011. The system improved several processes, including opting out of paper check stubs, providing electronic beneficiary and insurance enrollment, and consolidation of reporting that was once scattered across many standalone databases. The improvements in these areas are significant and have helped to save costs and streamline personnel management.

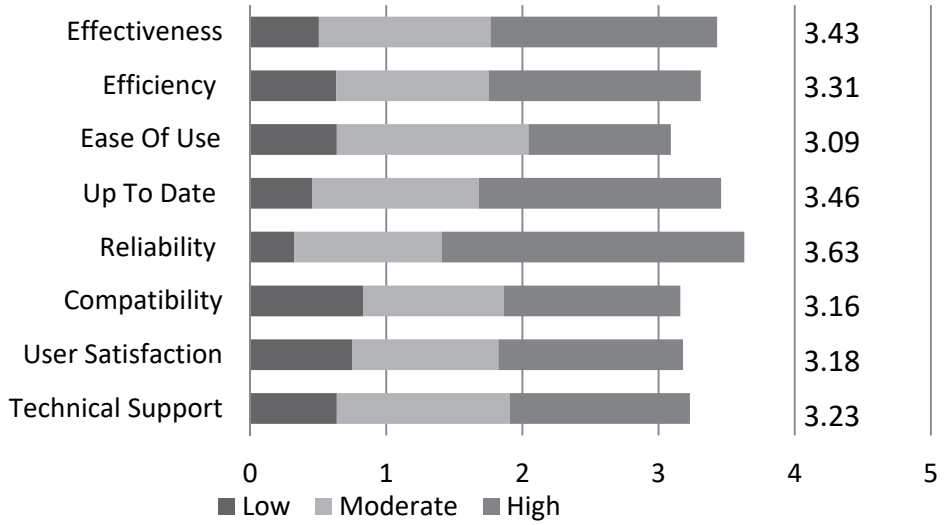
Fewer than half of agencies agreed that KHRIS was consistent with business needs, but nearly 82 percent reported that KHRIS was of high or very high importance to the agency.

Agency Ratings. Fewer than one-half of respondents to Program Review staff's policy survey agreed that KHRIS was consistent with agency business needs. Almost 32 percent said that KHRIS was not consistent with agency business needs. Several agencies commented that the lack of a self-service timekeeping component was a significant deficiency that consumed unnecessary staff time or required interfaces with other timekeeping systems that might introduce errors. However, on the technical survey, nearly 82 percent of agencies reported that KHRIS was of high or very high importance.

Program Review staff asked agencies to rate the performance of KHRIS according to several criteria. Figure 3.C shows the breakdown of performance criteria for KHRIS in the Program Review technical survey. The system scored less than 4 on a 5-point scale on all of the criteria, and less than 3.5 for all but one.

KHRIS was ranked the highest for reliability and lowest for ease of use. Agencies rated KHRIS less highly than eMARS, but KHRIS is newer and has had less time to mature and achieve acceptance.

Figure 3.C
Agency Ratings Of KHRIS



Note: Number of respondents: 61 to 68. The number of responses to each KHRIS evaluation criterion can vary because respondents were offered the option of identifying a criterion as not applicable. Bar segments show the relative portion of agencies responding with low, moderate, or high ratings. The numbers on the right show the average rating on a 5-point scale.
Source: Program Review staff technical survey of state agencies.

The absence of a self-service timekeeping feature was identified as a deficiency. The cabinet plans to pilot this feature in 2015.

KHRIS Deficiencies. Timekeeping was mentioned as a problematic area by various agencies. KHRIS was intended to have an online self-service component that would allow employees to enter their own time. Employee time reports would then be routed electronically to the appropriate supervisor for approval, followed by processing at the Personnel Cabinet.

KHRIS currently does not include the self-service timekeeping feature; however, time can be entered into KHRIS via agency human resources personnel. For instance, LRC employees fill out time sheets that are routed to the business office for manual entry into KHRIS. There are potential redundancies and errors associated with employee timekeeping, especially leave balances. Personnel Cabinet staff stated that self-service employee time entry is currently being developed, with a pilot project planned for 2015.

Some agencies use separate timekeeping systems that interface with KHRIS to run payroll, whereas others manually enter employee time.

Supplemental Procedures And Applications. Personnel Cabinet staff reported that seven agencies use separate timekeeping systems. These systems interface with KHRIS to transfer timekeeping information. For example, the Department of Corrections and the Department for Natural Resources use Kronos, a commercial timekeeping application, to track employee time.

Agency Business Applications

Agencies rated their own business applications as well performing or poorly performing and described their strengths and weaknesses.

Most agencies have at least one business application, and often several, that permit them to provide services or manage their operations more efficiently. Some were purchased, and some were developed specifically for the agency. This section describes some of the Program Review staff survey results about agency applications and provides a more detailed examination of two major agency applications.

The Program Review staff technical survey asked agencies to list one well-performing business application and up to three poorly performing applications. The areas in which well-performing applications were reported to excel were effectiveness (96 percent), efficiency (89 percent), being up to date (74 percent), and operating capacity (73 percent). For poorly performing applications, the areas cited most often as problematic were business flexibility (59 percent), compatibility with other systems (54 percent), and efficiency (54 percent). User satisfaction with applications the agencies considered well performing was cited as a strength 64 percent of the time. Satisfaction was cited as a weakness for poorly performing applications 48 percent of the time.

Kentucky Automated Management And Eligibility System

The Kentucky Automated Management and Eligibility System (KAMES) is a 21-year-old mainframe system that supports eligibility determination for many of the state's public assistance programs.

The Kentucky Automated Management and Eligibility System (KAMES) is a 21-year-old mainframe system that provides integrated casework and reporting support functions for the Supplemental Nutrition Assistance Program; State Supplementation for the Aged, Blind, and Disabled; Medicaid; Kinship Care; the Kentucky Transitional Assistance Program; and the Kentucky Children's Health Insurance Program.

The primary function of KAMES is to determine eligibility and benefits for public assistance programs. To do so, KAMES ensures that all necessary information is entered, validates the information,

and generates letters to request additional documentation or to inform the applicant about the eligibility decision.
In the process, certain confidential income, asset, and deduction information is required and must be kept secure. The KAMES user's ID and action taken are recorded every time a case is updated, creating an audit trail of all changes made to any case as well as the caseworker responsible. Moreover, KAMES security features limit users to specific functions within the system. For example, caseworkers can enter applications for assistance programs, but receptionists cannot.

KAMES was developed in 1993 based on a 1986 food stamp system. It costs $11.6 million per year to operate.

History And Costs. KAMES was developed by a vendor in 1993 as an enhancement of a food stamp eligibility system that had been implemented in 1986. When it was first implemented, KAMES was the first real-time electronic eligibility system in the country. Over time it grew to accommodate the programs that it supports today. The cabinet was unable to locate the cost of the original system but reported that the annual operating cost is approximately $11.6 million.[64]

Application Lifetime And Reliability. According to the Cabinet for Health and Family Services (CHFS), the expected lifetime of the KAMES system was approximately 10 to 20 years. KAMES operates on an IBM mainframe and has approximately 80 databases, 1,042 online and batch programs, and 1,089 display pages that caseworkers, IT technicians, and supervisors use. The system handles an average of 2 million transactions per day, with an average response time of less than 1 second.

According to the cabinet, KAMES continues to perform well, mainly because of the original project management process.

Accomplishments. According to CHFS, KAMES has performed well and continues to do so. CHFS cites the original development process, which included a strong partnership between public assistance program staff and IT development personnel and the presence of a large in-house IT support and development office. During the original development cycle, the cabinet's IT staff had substantial oversight over all vendor decisions and performance. CHFS asserted that such oversight is crucial in ensuring that vendors meet system requirements and project deadlines.

CHFS representatives mentioned several areas in which KAMES excels. The system is compatible with a number of other state and federal information technology systems. For example, KAMES gives case workers access to several databases containing information on applicants, including vehicle registration, unemployment benefits, drivers licenses, and quarterly wage

records. If an applicant's information can be verified by these systems, then eligibility can be determined more quickly.

KAMES, as it has aged, has developed some deficiencies. The cost of maintenance and support has increased.

Deficiencies. As it has aged, KAMES has developed some deficiencies, however. Unlike more modern interactive systems that operate with a Windows-like user interface, KAMES operates via a menu-driven keyboard-based user interface.[65] Training for users of the KAMES system has become problematic as new users find it difficult to navigate the outdated user interface intuitively. KAMES is less automated than modern systems and does not offer real-time client self-service capability, requiring more manual effort from caseworkers. In addition, until recently, each case was assigned to a specific caseworker, and workers could access and modify only their own cases. KAMES was modified so that caseworkers and supervisors could access any case in order to improve case processing efficiency, and supervisors were given the ability to reassign active cases to other caseloads. However, the system was no longer able to provide statistics to monitor worker performance after the modification.

The most compelling reason for a KAMES replacement, according to CHFS, is the increasing cost associated with maintaining and supporting the system. Technicians fluent in KAMES's programming language are becoming rarer, and the older IT architecture means that all changes to eligibility procedures require reprogramming the system itself. This involves business analysts to write up the new requirements, developers to code the changes, quality assurance staff to test the changes, and support staff to fix any errors.[66]

The cabinet began to request a new, more integrated eligibility application in 2002. It was partly funded in 2004, but the majority of the funding, $130 million, was allocated in 2012 (Medicaid eligibility only) and 2013 (other public assistance programs).

A new eligibility system would have better integration with other systems and automate more paper-based processes. Newer systems are more flexible and easier to update when changes are needed. As a result, CHFS began to request a replacement for KAMES with the 2002 capital budget. In the 2004 budget, $21 million was appropriated for two initial phases. The project's substantial cost probably contributed delays in further funding. The estimated cost in the 2010 capital request was almost $221 million, of which nearly $73 million would have been state funds.

The project was eventually fully funded in 2012 and 2013 at a much lower cost through enhanced federal cost sharing. Changes in the Medicaid program required a new eligibility system, so the 2012-2014 budget appropriated $50 million, including $5 million in state funds, to replace the KAMES Medicaid eligibility function.

Because Medicaid was part of a broader public assistance eligibility system in Kentucky and in many other states, federal funding was made available at a 90 percent match rate for the replacement of existing eligibility systems that supported other federally funded public assistance programs along with Medicaid. In order to qualify for the enhanced federal match, such projects were required to be completed by December 31, 2015.[67]

The cabinet estimated that the additional cost for the complete replacement of KAMES, plus some related programs such as the Medicaid waivers, would be $80 million, of which $14 million would be state funds.[h] This amount was approved during the 2013 Interim, as provided by KRS 45.760(7), to allow time to complete the project by the federal deadline. The project will result in a single integrated eligibility system at a cost to the state of $19 million. Federal funds will cover the remaining $111 million, for a total project cost of $130 million.[i]

Automated Vehicle Information System

The Automated Vehicle Information System (AVIS), was built in 1982 and still functions well. It costs more than $3.5 million per year to operate.

The Automated Vehicle Information System (AVIS) is maintained by the Transportation Cabinet to collect title and registration information on vehicles and boats and information on motor vehicle operators license holders and those with personal identification cards (KRS 446.010(55)).

History And Costs. The original system was built by McDonnell Douglas and implemented statewide in 1981.[68] Original cost information for the system was unavailable.[69] Maintenance costs for AVIS applications and operational support through COT were almost $3.7 million in FY 2013 and more than $3.5 million in FY 2014.[70]

Application Lifetime And Reliability. According to cabinet officials, AVIS functions well, is online continuously, and generally has a good response time for users. Cabinet and Fayette County Clerk's Office staff reported that system response slowed at times, but they explained it as likely a connectivity issue rather than an AVIS issue. The system must remain functional 24 hours per day, 7 days per week to meet the demands of multiple groups

[h] The state amount is greater than 10 percent of the total because some of the supported public assistance programs are not federally funded or because some of the functionality extends beyond what would have been required for Medicaid alone.

[i] The $21 million from 2004 was not included because not all components of that project will continue to be used as part of the KAMES replacement.

of users. AVIS's broader uses include providing data for the calculation, preparation and mailing of vehicle ad valorem tax notices and information repository for vehicle insurance status (KRS 134.805 and 186A.040). The system is used for data entry or information by at least eight state cabinets; the auditor of public accounts; the secretary of state; the Administrative Office of the Courts; the Federal Bureau of Investigation; county attorneys, sheriffs, and clerks; automobile dealers; insurance companies; citizens; and others.[j] Transportation Cabinet staff reported that with proper maintenance the system could last another 15 years.

Training And Documentation. There are no existing training manuals for AVIS, and training is done user to user. The application uses a dated mainframe platform and design that requires keyboard codes to navigate the screens, and over time users have developed "cheat sheets" to operate the system.

AVIS uses an older, less flexible technology and keyboard-based user interface. Complete training may take 6 to 10 months.

Deficiencies. The older, less flexible technology requires reprogramming to add new data elements or implement regulatory changes. IT staff familiar with the technology are retiring, and it has become difficult to find or train IT staff to work on the system.

Learning multiple keyboard codes increases training time required for new users, especially because younger users have no experience with this kind of interface. New AVIS users may become familiar with one type of transaction within 6 weeks, but becoming fully trained on the system takes 6 to 10 months.[71] These factors contribute to a loss of productivity for AVIS users.

In May 2009, 3M began to develop a replacement for AVIS. The Transportation Cabinet terminated the contract in May 2014 and plans to complete the project with its own staff.

In May 2009, the cabinet entered into a contract with 3M Motor Vehicle Systems to develop a replacement for AVIS and the Boat Titling and Registration System. After 5 years of work, the cabinet terminated the contract with 3M in May 2014. Cabinet officials speculated that 3M had underestimated the project's cost and had become overextended after receiving similar contracts with multiple states.[72] The cabinet plans to complete the new system with its own staff.[73]

The cabinet's project team reported that there will be significant difficulties in converting the data from AVIS to the new system, similar to difficulties reported when transitioning to new applications, including the new human resources system.

[j] Of these agencies, only the auditor and county clerks interact with AVIS via the user interface; the others use data extracted from AVIS.

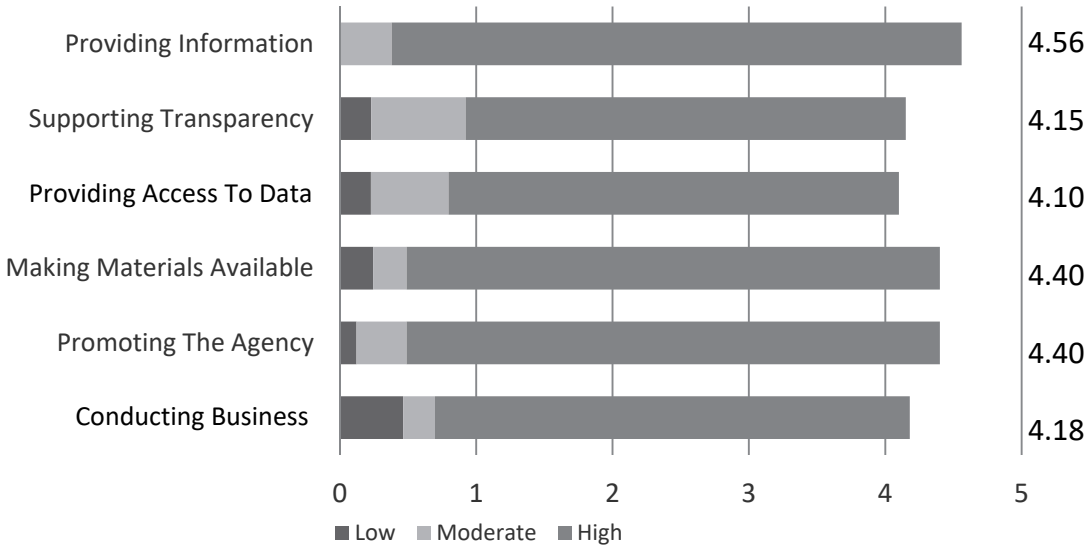
Web Presence

Agencies rated all Web presence functions as highly important and reported that their Web presence was working well. Two agencies did not have a Web presence.

Program Review staff also asked agencies for information about their use of the Internet to provide information and interact with the public. Agencies viewed all of the Web presence functions as highly important and reported that their current Web presence was performing well in these roles. Only two of the responding agencies reported that they did not have a public Web presence. One explained that it had only internal tasks and no public role. The other reported that its Web presence was never funded.

The technical survey asked about the importance of different Web presence functions. Figure 3.D shows that the functions considered most important were providing information to the public about the agency (4.56), providing access to forms and documents (4.40), and promoting the agency (4.40). These were all rated high or very high. Agencies saw providing public access to agency data as the least important function, but it was still given high importance (4.10).

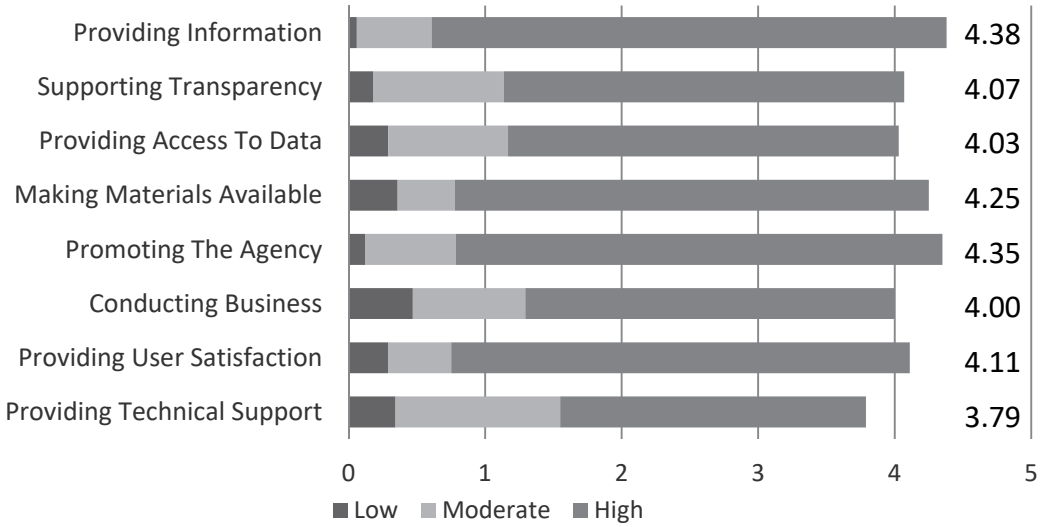
Figure 3.D
Agency Evaluation Of Importance Of Web Presence Functions



Note: Number of respondents: 66 to 72. The number of responses to each web presence criterion can vary because respondents were offered the option of identifying a criterion as not applicable. Bar segments show the relative portion of agencies responding with low (very low and low combined), moderate, or high (high and very high combined) ratings. The numbers on the right show the average rating on a 5-point scale.
Source: Program Review staff technical survey of state agencies.

Agencies also responded to questions about the performance of their Web presence in eight areas. Performance was generally rated as high or better, as shown in Figure 3.E. The highest-rated areas were providing general information to the public (4.38), promoting the agency (4.35), and making forms and documents available to the public (4.25). Agencies rated their Web presence lowest on providing technical support (3.79). They reported high user satisfaction (4.11).

Figure 3.E
Agency Evaluation Of Performance Of Web Presence



Note: Number of respondents: 66 to 72. The number of responses to each web performance criterion can vary because respondents were offered the option of identifying a criterion as not applicable. Bar segments show the relative portion of agencies responding with low (very low and low combined), moderate, or high (high and very high combined) ratings. The numbers on the right show the average rating on a 5-point scale.
Source: Program Review staff technical survey of state agencies.

Chapter 4

Technology Inventory And Cost

As of late 2014, there is no complete inventory of technology assets that belong to the state government, and there is no exact count of IT personnel, whether employees or contractors. Furthermore, the accounting system does not contain the information necessary to determine how much the commonwealth has spent on technology.

Asset Inventory

As part of consolidation efforts, the Commonwealth Office of Technology is completing a thorough inventory of IT equipment and applications.

Infrastructure And Applications

The Commonwealth Office of Technology, as part of the IT consolidation, is completing a thorough inventory of IT equipment and applications. COT is using a special network tool to detect and count all devices that are connected to agencies' networks.

Prior to the consolidation, COT and its consultant NTT Data asked agencies to report their infrastructure assets. Table 4.1 shows the numbers of IT assets that were reported by state agencies other than COT as of March 2013. The report indicated that the infrastructure was distributed among 1,160 locations.

Table 4.1
State Agency Infrastructure Assets
Not Including Commonwealth Office Of Technology
As Of March 2013

Asset	Number
Personal computers	28,048
Servers	3,121
Storage	1,838 terabytes
Network devices	2,040
Communications systems:	
PBX	54
Key systems	258
VoIP systems	73

Source: NTT Data. "IT Infrastructure Initiative I.3 IT Infrastructure Assessment – Current State Report –Final Report." n.p. 2013. Pp. 11-12.

COT did not ask for an inventory of agency business applications. However, COT itself has developed many business applications and provides support for them. As of February 2014, COT listed 147 such applications, of which 136 were for other agencies. Most of them were for the Department of Revenue.[74] It seems likely that there are many more business applications developed by other agencies themselves. COT consolidation staff are collecting current information about agency business applications.

Personnel

COT does not keep track of IT personnel at agencies. The office only attempts to ensure that all infrastructure support personnel are assigned to COT.

COT does not keep track of IT personnel at agencies. The office only attempts to ensure that all infrastructure support personnel are assigned to COT. The Personnel Cabinet sends the Finance and Administration Cabinet all requests to fill new IT positions in order to prevent agencies from hiring if the job duties should be assigned to COT.[75]

A 2012 report estimated that statewide, including contracted staff, there were 463 full-time equivalents devoted to infrastructure maintenance and support, and 620 full-time equivalents involved in application and website development, maintenance, and support.

The 2012 Pacific Technologies report estimated that there were approximately 463 full-time equivalents (FTE) devoted to infrastructure maintenance and support statewide, of whom approximately 66 were contracted staff. Statewide, there were approximately 620 FTEs involved in application and website development, maintenance, and support, of whom approximately 319 were contracted staff.[76]

The Smart Government Initiative, which the governor began in 2010, was an effort among multiple cabinets to review spending in different areas, including information technology. According to one of the initiative's work groups, the only way to count the personnel involved in IT was to use IT-related job classifications and extract the information from the human resources system.[77] A North Carolina report described the same issue, suggesting that this might be a common difficulty.[78] This method does not take into account that people in IT positions might not spend all of their time on technology-related tasks or that employees in non-IT positions sometimes spend a significant amount of time on IT tasks.

Expenditures On Technology

There is no definitive accounting of IT expenditures in state government. Agencies provided a 2012 cost estimate greater than $152 million for infrastructure equipment, maintenance, and support.

There is no definitive accounting of IT expenditures in state government. The statewide accounting system does not contain the type of information needed to assign all IT costs reliably to an IT accounting category.

Efforts have been made to estimate the cost of technology. Based on estimates by state agencies, the Pacific Technologies report showed approximate costs for infrastructure equipment, maintenance, and support. The annual cost estimate for those items alone was more than $152 million.[79]

It is reasonable to assume that tens of millions of dollars are spent each year on capital IT projects.

Again, this did not include the cost of development, maintenance, and support for business applications and websites. It seems likely that the amount for business applications must be similar to the amount spent on infrastructure. For example, as of July 1, 2014, COT reported the net amount still available for currently active capital IT projects as nearly $204.8 million.[a] [b] These were amounts remaining from the previous biennium or earlier. In addition, the amount appropriated for capital IT projects for the new biennium was approximately $100 million, for a total of $304 million. While the annual spending is likely to be less than half that amount, it is reasonable to assume that tens of millions of dollars would be spent each year on capital IT projects alone. This does not include IT projects that agencies fund out of their operating budgets.

The Smart Government Initiative formed an IT Work Group. Within that work group, the Financial Reporting and Coding Subgroup considered how to calculate IT expenditures. It found the following:

- In part because of historical differences in the ways agencies have recorded IT expenditures, it was not possible to obtain an accurate calculation of government-wide IT expenditures.
- Another factor was the lack of specific directions to agencies about how to code IT expenditures in the accounting system.
- Any changes in the way expenditures were coded would require approval from the Office of the Controller and the

[a] In this report, costs shown in the text do not include the federally funded Kentucky Health Insurance Exchange because the project is so large that it dwarfs any other single project, because most of the funds were not explicitly appropriated by the General Assembly, and because it is paid entirely with federal funds. Where applicable, the corresponding number will be shown in a footnote.

[b] The amount remaining for the Kentucky Health Insurance Exchange in the COT capital projects report was $108.7 million.

Office of the State Budget Director and input from agency program staff.[80]

Some improvements have been made, but the difficulties listed above have prevented a comprehensive solution from being implemented. The infrastructure consolidation by itself has created more certainty and permitted the costs associated with infrastructure to be accounted for through COT, which was reported to be well versed in properly coding IT expenses.

Accounting For Expenditures On IT Goods And Services

Program Review staff determined that it is not possible using information currently in the statewide accounting system to calculate the amount spent on technology.

Program Review staff determined that it is not possible using information currently in the statewide accounting system to calculate the amount spent on technology. The primary reason is that payments are assigned to accounting categories that do not show whether the purpose was for IT or for something else. The type of accounting category that shows the purpose of a payment is the object code in eMARS.

There does appear to be a complete set of object codes that would permit most, perhaps all, payments for IT goods and services to have an IT object code. However, most agencies other than COT appear to be miscoding significant portions of their IT expenditures.

There does appear to be a complete set of object codes that would permit most, perhaps all, payments for IT goods and services to have an IT object code. However, most agencies other than COT appear to be miscoding significant portions of their IT expenditures.

Staff identified nine vendors having the largest number of IT contracts. All payments to these vendors for FY 2012, FY 2013, and FY 2014 were extracted from eMARS and analyzed.[c]

Object codes were classified by whether or not they were designated as IT expenditures. The eMARS infoAdvantage report 2270, "IT Expenditure by Cabinet-Dept-Obj Code," provided the source for IT object codes.[d] Appendix H lists the IT object codes.

Many object codes not on the report—56 distinct codes—were used on payments to the top IT vendors. The top three non-IT object codes were E146, "Consulting Services-1099 Rept"; E150, "Other Professional Services-1099 Rept"; and E725, "Miscellaneous Expenditure." These codes might represent any

[c] Details of vendor selection and verification are in Appendix A.
[d] One object code not on the report was found that might be considered an IT code, but only a few small payments were made with that code, E354 "Expend Rembrsmnt-Mobile Svcs."

type of payment. It is especially poor practice to code an expense as miscellaneous, but almost $14 million of IT expenses in the sample were coded this way over 3 years.[81] The amounts using the top three IT and non-IT object codes are detailed in Appendix H.

The following additional object codes were used for amounts greater than $500,000 over the 3-year period. Some of these, such as General Construction, would not be considered IT expenses and were probably used incorrectly.

- E170 Professional Services-W-2 Rept
- E191 Temporary Manpower Services
- E232 Maint Of Equipment-1099 Rept
- E321 Office Supplies
- E346 Furn/Fixt/Off Eqp Under $5,000
- E703 General Construction
- E712 Movable Equipment Furnishings

As shown in Table 4.2, the use of non-IT object codes for IT expenditures actually increased in FY 2014 from 31 percent to 38 percent of all the payments made to these vendors. If mixed with all the other payments recorded in eMARS, it would not be possible to identify these as IT expenditures. However, supporting the assertion that COT is coding its payments properly, amounts paid by COT to these vendors were coded with IT object codes almost all the time during the 3-year period.

Extrapolating from these figures, it seems likely that more than a third of expenditures outside COT for IT goods and services are not identifiable in eMARS.

Table 4.2
Total Expenditures By IT Grouping For Sampled Payments
Fiscal Year 2012 To Fiscal Year 2014
(In Millions Of Dollars)

	2012		2013		2014	
Group	**Dollars**	**Percent**	**Dollars**	**Percent**	**Dollars**	**Percent**
IT object codes	$43.1	68%	$44.0	69%	$38.8	62%
Non-IT object codes	20.5	32	19.6	31	24.1	38
Total	$63.7	100%	$63.6	100%	$62.9	100%

Note: Excluding the Kentucky Health Benefit Exchange. Totals for the exchange to these vendors were $47.0 million in FY 2013 and $38.3 million in FY 2014.
Source: Program Review staff sample of eMARS payments to nine large IT vendors.

Although COT appears to be well versed in the use of IT object codes, many other agencies are not.

Although COT appears to be well versed in the use of IT object codes, many other agencies are not. The Smart Government Initiative IT Financial Reporting and Coding Subgroup report found that there were no specific directives explaining the use of object codes for IT expenditures, and that appears to remain true.[82] In fact, there is no explicit documentation that explains the intended use of individual object codes in eMARS beyond the brief names shown above. FAC reported that a document is being developed to explain object codes in greater detail.

One object code illustrates this lack of knowledge, apparently at more than one agency. The Finance and Administration Cabinet confirmed that object code E432, "Grants-In-Aid Federal," was intended to be used to provide funds in the form of grants to other entities. It was not intended to be used for purchases, whether or not made with grant funds. However, one agency explained that it always used this code for purchases with federal grant funds, and examinations of other agencies' eMARS payments suggested that they were using it in a similar manner.

The object codes in eMARS include two categories for capital expenditures, but the Office of State Budget Director explained that they are no longer needed because capital expenditures are identified by specific funding codes. As a result, payments on capital projects may use any applicable object code. These two sets of capital outlay object codes include IT codes that overlap other types of object codes and make it difficult to obtain a total for a given type of expense. For the sample of IT vendors examined, capital IT codes were used for $21.6 million, $29.9 million, and $4.6 million of expenditures in fiscal years 2012 through 2014. There was no obvious explanation for the decrease, but this is another area of coding for which agencies appear to need education and oversight.

Recommendation 4.1

Recommendation 4.1

The Finance and Administration Cabinet should produce and maintain a document explaining the intended use of each object code in the statewide accounting system. The cabinet should implement an ongoing process to periodically examine and validate samples of payments from all agencies and take corrective action when patterns of miscoding are found.

Accounting For IT Personnel Expenditures

The statewide accounting system does not include information that would permit a calculation of IT employee costs. The KHRIS payroll record does not contain all the accounting information needed to determine whether an employee's pay was for IT purposes.

The statewide accounting system does not include information that would permit a calculation of IT employee costs. Rather, payroll expenses are recorded in aggregate by departmental units and specified accounting elements, not by individual employee. At the same time, the KHRIS payroll record does not contain all the accounting information needed to determine whether an employee's pay was for IT purposes. As with counting IT employees, the associated costs would have to be estimated using information from KHRIS about employees with IT-related job classifications, and it would fail to account for non-IT work done by staff in IT jobs and for IT work done by staff in non-IT jobs.

Another method described in the initiative's report and in use at the Cabinet for Health and Family Services and the Transportation Cabinet would be to assign all IT staff and only IT staff to specific organizational units within an agency. If that were done, then it would be possible to estimate IT staff costs by totaling the payroll amounts within those units. However, this method would fail to capture non-IT work done by staff in the IT unit and IT work done by staff not in the IT unit. This method has been used in conjunction with information about job classifications, but even together they would not account for all IT work.

Calculation of the cost of IT contractors would depend on the accuracy with which their payments were coded. From FY 2012 through FY 2014, more than $39.2 million was paid for IT contract services using the non-IT object codes E146 (Consulting Services-1099 Rept) and E150 (Other Professional Services-1099 Rept). Over the same period, more than $1.2 million was coded as E191 (Temporary Manpower Services). The total amount for IT services is greater than this because these amounts were calculated for only a sample of IT vendors. It appears that additional object codes would be needed to distinguish IT contractor payments from other contractor payments.

Recommendation 4.2

Recommendation 4.2

The Commonwealth Office of Technology should work with the Finance and Administration Cabinet and the Personnel Cabinet to develop a means to calculate the full-time equivalents and personnel costs associated with information technology work by state employees.

Conclusion About IT Personnel And Expenses

A good inventory of infrastructure and applications should be available after the consolidation is completed. It will be important for COT to keep the inventory up to date, but that should be part of its fundamental mission to ensure effective and efficient use of technology in state government.

Most infrastructure costs should be well accounted for after consolidation, but the cost of IT personnel and application development outside COT will remain uncertain.

Most infrastructure costs should be well accounted for after consolidation because COT will be the single channel for purchase of equipment, software, other infrastructure, and infrastructure support services. Assuming that all personnel at COT are considered IT staff, their cost should be easy to calculate. The remaining uncertainties will be the costs of IT personnel and business application development and support at other agencies.

Appendix A

How This Study Was Conducted

Program Review staff reviewed technology literature and communicated with state agency officials and industry representatives. Staff conducted interviews, focus groups, and two surveys of state agencies. Staff obtained and analyzed IT capital planning information from the Capital Planning Advisory Board staff. Staff reviewed four major business applications in detail.

Determination Of Scope

Program Review staff identified state agencies that were within the scope of the study. They included:

- All agencies headed by statewide elected officials
- Administrative Office of the Courts
- All agencies within the purview of the governor except agencies with fewer than 10 employees
- Agencies within the purview of the governor having fewer than 10 employees if there appeared to be significant technology assets at the agency
- Other agencies created by the General Assembly that appeared to have significant technology resources.

All these agencies were included in the surveys, so they are listed in Appendix C and Appendix D along with their response status.

Survey Methodology

Staff determined that it would not be practical to survey state employees generally about their use of technology. Focus groups and interviews with agency staff indicated that users often are not able to accurately identify the source of problems with technology. Sometimes a reported problem of response time, for example, might actually be a problem with the network or the Internet connection rather than with a business application. Sometimes frustration with technology might result from lack of training rather than a defect in the technology.

In the development of agency surveys, staff met with agency officials and staff individually and in focus groups.

Two surveys were developed using the online SurveyMonkey service. Unique survey links were created for each agency and sent via email. A secure Internet connection, similar to that used for online banking, was established for responding to the surveys.

Policy Survey

Program Review staff developed a survey that asked agency leaders questions primarily focused on policy and decision making about technology. Cabinet secretaries, department commissioners, and their equivalents were surveyed.

Survey recipients and a summary of survey responses are described in Appendix C.

Technical Survey

Program Review staff developed a survey that asked agency leaders to designate someone to collect responses to detailed technology questions from the appropriate agency officials and staff. Surveys were sent to departments and equivalent agencies, not to cabinets. However, the Transportation Cabinet provided a single response rather than one for each department.

Survey recipients and a summary of survey responses are described in Appendix D.

Analysis Of Capital Planning Data

The LRC Office for Computing and Information Technology extracted data for the three most recent capital planning periods from the Capital Planning System. Program Review staff created a dataset of all IT projects except those requested by state institutions of higher education, those marked as inactive, those requested by the Kentucky Department of Education for use by local schools, and those requested by the Council on Postsecondary Education for the use of public schools, libraries, and institutions of higher education.

Review Of Major Business Applications

Program Review staff interviewed agency officials and users and reviewed documents describing the business applications. In three cases, staff observed demonstrations of the applications and in one of those cases used the application itself.

Staff selected the two enterprise business applications—the statewide accounting system and the human resources system—because both are crucial to every agency's operation. Staff also selected two agency-specific business applications that were large, complex systems affecting many members of the public. The agency applications selected were the Cabinet for Health and Family Services' Kentucky Automated Management and Eligibility System and the Transportation Cabinet's Automated Vehicle Information System.

Analysis Of IT Expenditures

In order to obtain examples of object codes for IT expenditures, Program Review and Budget Review staff identified the 10 vendors with the largest number of contracts having the following IT procurement types:

- 4 Computer Equipment or Software
- 5 Computer Maintenance
- 6 Computer Services

All contracts of all types for those vendors were then extracted to determine whether the vendors appeared to provide exclusively IT goods and services. One vendor was found to have a contract that appeared to have a significant non-IT component, so that vendor was removed from the list. All payments to the remaining nine vendors were then extracted for FY 2012 to FY 2014. For verification, a sample of their payments was examined in eMARS, and all were found to be for IT purposes. The analysis of payments by object code was then conducted on all the payments.

Appendix B

Technology Advisory Councils

It appears that the Kentucky Information Technology Advisory Council defined at KRS 42.732 has not met since 2002. Beginning in 2013, the Commonwealth Office of Technology convened its own Technology Advisory Council to advise the chief information officer.

Kentucky Information Technology Advisory Council Statutes

KRS 42.726

This section contains one paragraph, (1)(n), that refers to the council.

(1) The roles and duties of the Commonwealth Office of Technology shall include but not be limited to:

…

(n) Providing staff support and technical assistance to the Geographic Information Advisory Council and the Kentucky Information Technology Advisory Council;

KRS 42.732 (Effective January 1, 2015)

This section was modified by HB 5 of the 2014 Regular Session. The bill added paragraph (1)(b), shown in italics below, which becomes effective on January 1, 2015.

(1) There is hereby created the Kentucky Information Technology Advisory Council to:
   (a) Advise the executive director of the Commonwealth Office of Technology on approaches to coordinating information technology solutions among libraries, public schools, local governments, universities, and other public entities;
   (b) Advise the executive director of the Commonwealth Office of Technology on coordination among and across the organizational units of the executive branch of state government to prepare for, respond to, and prevent attacks; and
   (c) Provide a forum for the discussion of emerging technologies that enhance electronic accessibility to various publicly funded sources of information and services.

(2) The Kentucky Information Technology Advisory Council shall consist of:
   (a) The state budget director or a designee;
   (b) The state librarian or a designee;
   (c) One (1) representative from the public universities to be appointed by the Governor from a list of three (3) persons submitted by the Council on Postsecondary Education;

(d) Three (3) citizen members from the private sector with information technology knowledge and experience appointed by the Governor;

(e) Two (2) representatives of local government appointed by the Governor;

(f) One (1) representative from the area development districts appointed by the Governor from a list of names submitted by the executive directors of the area development districts;

(g) One (1) member of the media appointed by the Governor;

(h) The executive director of the Kentucky Authority for Educational Television;

(i) The chair of the Public Service Commission or a designee;

(j) Two (2) members of the Kentucky General Assembly, one (1) from each chamber, selected by the Legislative Research Commission;

(k) One (1) representative of the Administrative Office of the Courts;

(l) One (1) representative from the public schools system appointed by the Governor;

(m) One (1) representative of the Kentucky Chamber of Commerce; and

(n) The executive director of the Commonwealth Office of Technology.

(3) Appointed members of the council shall serve for a term of two (2) years. Members who serve by virtue of an office shall serve on the council while they hold the office.

(4) Vacancies on the council shall be filled in the same manner as the original appointments. If a nominating organization changes its name, its successor organization having the same responsibilities and purposes shall be the nominating organization.

…

Technology Advisory Council

The following is the charter of the Commonwealth Office of Technology's Technology Advisory Council, dated December 3, 2013.

1.0 Purpose

This document is the charter for the Technology Advisory Council (TAC). The TAC functions as the primary governance body for information technology in Kentucky state government and advises the State CIO on implementation and management of IT initiatives that support state government services.

2.0 Authority

The roles and duties assigned to the State CIO include assessing, recommending, and implementing information technology governance and organization design, and under this authority, the Technology Advisory Council is being chartered. Specifically, KRS 42.730 designates the executive director of the Commonwealth Office of Technology (the State CIO), as the principal advisor to the Governor and the executive cabinet on information technology policy and requires him to carry out functions necessary for the efficient, effective, and economical administration of information technology and resources within the executive branch.

KRS Chapter 42 charges the Commonwealth Office of Technology (COT) with developing strategies and policies to support and promote the effective application of information technology within state government as a means of saving money, increasing employee productivity, and improving state services to the public.

3.0 Function

Information technology governance, as defined by Gartner, is a process that ensures the effective and efficient use of IT in enabling an organization to achieve its goals. Effective IT governance for the Commonwealth of Kentucky ensures the appropriate evaluation, selection, prioritization, and funding of competing IT investments; oversees and coordinates the implementation of technology initiatives; and creates measurable business benefits for the Commonwealth. The Technology Advisory Council (TAC) is assigned a key consultative and advisory role to the State CIO in the Commonwealth's governance process.

The TAC has a two-fold mission:

(1) to be the representative voice of state agencies to assure government and technology services are aligned properly throughout the enterprise, and

(2) to assist the State CIO and the Commonwealth Office of Technology in envisioning and embracing emerging IT capabilities and models.

4.0 Responsibilities

The council will advise the CIO on:

- Development of the enterprise IT strategic plan.
- Overseeing implementation of IT infrastructure consolidation.
- Reviewing and assessing performance of shared IT infrastructure services that include establishing reporting metrics.
- Reviewing IT service levels and rates.
- Recommending new IT service offerings.
- Developing enterprise-wide capital IT project oversight.

5.0 Membership

TAC members will represent business-programmatic, fiscal, and IT leadership from executive branch cabinets or agencies and may include up to three members from each cabinet or major agency.
The full TAC will meet on a quarterly basis, with the State CIO serving as chair.

6.0 Steering Committee

To enhance oversight and timely input into the IT governance process, the TAC will establish a Steering Committee that will provide oversight of enterprise IT policy; advise on enterprise priorities; and, endorse and communicate overall enterprise IT direction. Additionally, the Steering Committee will provide project governance to the I.3 Initiative and will assist in ensuring the success of this program. The TAC Steering Committee will work closely with the State CIO in developing and carrying out IT strategic initiatives and priorities. The Steering Committee will also participate in the overall management of the full Technology Advisory Council.

Steering Committee members will include the State CIO, who will serve as Chair, five permanent members, and five rotating members. The rotating members will serve a one-year term. The Steering Committee members will be chosen by the State CIO from a list of volunteer nominations.

The TAC Steering Committee will meet on a monthly basis.

7.0 Workgroups And Subcommittees

In support of its work, the TAC will establish other workgroups or subcommittees on an as-needed basis.

Technology Advisory Council Membership

The following table lists the membership of the Technology Advisory Council as of October 3, 2014.

Agency	Subject Area
Cabinet for Health and Family Services, Office of Administrative and Technology Services	IT
Cabinet for Health and Family Services, Office of Policy and Budget	Budget
Commerce Cabinet, Department of Fish and Wildlife Resources	IT
Commonwealth Office of Technology	IT
Council on Postsecondary Education	Business
Department of Military Affairs	Business
Economic Development Cabinet	Business
Education and Workforce Development Cabinet	IT
Education and Workforce Development Cabinet, Department for Libraries and Archives	Business
Education and Workforce Development Cabinet, Department of Workforce Investment	Budget
Energy and Environment Cabinet, Department for Natural Resources	Business
Energy and Environment Cabinet, Department for Environmental Protection	Business
Finance and Administration Cabinet	Business
Finance and Administration Cabinet	Business
Finance and Administration Cabinet	IT
Justice and Public Safety Cabinet, Department of Corrections	Business
Justice and Public Safety Cabinet, Department of Criminal Justice Training	IT
Justice and Public Safety Cabinet, Department of Juvenile Justice	IT
Justice and Public Safety Cabinet, Department of Juvenile Justice	IT
Justice and Public Safety Cabinet, Department of Public Advocacy	Business
Kentucky State Fair Board	IT
Kentucky State Police	IT
Labor Cabinet	IT
Labor Cabinet, Public Protection Cabinet, and Energy and Environment Cabinet	IT
Labor Cabinet, Public Protection Cabinet, and Energy and Environment Cabinet	Budget
Office of State Budget Director	Budget

Agency	Subject Area
Personnel Cabinet	IT
Personnel Cabinet, Department of Human Resources Administration	Business
Personnel Cabinet, Office of Administrative Services	Budget
Public Protection Cabinet, Department of Alcoholic Beverage Control	IT
Public Protection Cabinet, Department of Financial Institutions	IT
Public Protection Cabinet, Department of Insurance	IT
Tourism, Arts and Heritage Cabinet, Department of Parks	IT
Transportation Cabinet	Business
Transportation Cabinet	IT

Note: Agencies listed more than once have more than one member on the council.
Sources: Lile, Janet. "LRC Program Review re TAC membership." Message to Van Knowles. Oct. 3, 2014. Email; Flanery, Lori. "Finance Recommendations." Message to Van Knowles. Oct. 28, 2014. Email.

Appendix C

Policy Survey

Summary Of Survey Responses

1. Which of the following groups are typically involved in business process planning at your agency? (select all that apply)

Answer Options	Response Percent	Response Count
Department leadership	91.3%	73
Program managers	66.3	53
COT representatives	31.3	25
Program staff	52.5	42
Administrative support staff	37.5	30
Cabinet secretaries	28.8	23
Outside experts	32.5	26
Agency IT staff	48.8	39
Clients / consumers	35.0	28
Governor's Office	15.0	12
Field staff	31.3	25
Agency IT leadership	50.0	40
Community groups	16.3	13
Other agencies	17.5	14
Other (specify)	10.0	8
Respondents		80

Note: Response percentages total more than 100 and the response count is greater than the total of individual responses because respondents could select more than one response.

2. Comments about business process planning (optional)

	Response Count
Respondents	19

3. Thinking about all the times you have faced major challenges to improving your agency's technology equipment, indicate how often each of the following was a major challenge:

Answer Options	Never A Major Challenge	Seldom A Major Challenge	Sometimes A Major Challenge	Often A Major Challenge	Rating Average	Response Count
Training of users	11	27	30	10	2.50	78
Training of support staff	11	36	22	9	2.37	78
Number of support staff	8	24	32	14	2.67	78
Funding	6	9	32	31	3.13	78
Vendor support	11	30	31	6	2.41	78
Organizational acceptance of change	7	37	23	11	2.49	78
Executive and Legislative support	17	32	22	7	2.24	78
Compatibility with other systems and data	5	24	31	18	2.79	78
Network capacity	7	35	26	10	2.50	78
Providing technology to field offices and field employees	16	27	20	15	2.44	78
Comments about major challenges to improving technology equipment, including other challenges not listed (optional):						14
Respondents						78

4. Who is the primary decision maker about making improvements in technology equipment?

Answer Options	Response Percent	Response Count
You and your staff	59.0%	46
Commonwealth Office of Technology	20.5	16
Other (specify)	20.5	16
Respondents		78

5. Comments about decision making for improvements in technology equipment (optional)

	Response Count
Respondents	21

6. Indicate how strongly you agree or disagree with the following statement: "The eMARS statewide accounting system is consistent with and effectively supports the agency's current business needs."

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	N/A	Rating Average	Response Count
1	12	17	33	7	8	3.47	78
Comments about eMARS (optional)							16
Respondents							78

7. Indicate how strongly you agree or disagree with the following statement: "The KHRIS statewide personnel and payroll system is consistent with and effectively supports the agency's current business needs."

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	N/A	Rating Average	Response Count
2	21	15	28	7	5	3.23	78
Comments about KHRIS (optional)							22
Respondents							78

Important Business Applications

Question	Response Count
8. Important Business Application 1	57
12. Important Business Application 2	35
16. Important Business Application 3	21
20. Important Business Application 4	18
24. Important Business Application 5	12
Responses	143
Respondents	63

Note: Numbers represent valid responses to each question. Six respondents gave invalid responses for Q8 but valid responses for subsequent applications, so the number of respondents is greater than the number of responses for any single question.

9., 13., 17., 21., 25. What function does [the important business application] serve?

Answer Options	Response Percent	Response Count
Performs or assists with the core agency mission	67.1%	96
Performs or assists with agency administration	21.7	31
Other (specify)	11.2	16
Responses		143

10., 14., 18., 22., 26. Rate the performance of [the important business application] (with 1=Poor and 5=Excellent).

Answer Options	Response Percent	Response Count
1 - Poor	4.2%	6
2	5.6	8
3	19.6	28
4	31.5	45
5 - Excellent	39.2	56
Comments about the performance of [the important business application] (optional)		44
Responses		143

27. Thinking about all the times you have faced major challenges to improving your agency's business applications, indicate how often each of the following was a major challenge:

Answer Options	Never A Major Challenge	Seldom A Major Challenge	Sometimes A Major Challenge	Often A Major Challenge	Rating Average	Response Count
Training of users	9	29	26	10	2.50	74
Training of support staff	12	33	22	7	2.32	74
Number of support staff	9	18	37	10	2.65	74
Funding	8	12	27	27	2.99	74
Vendor support	14	29	24	7	2.32	74
Organizational acceptance of change	9	29	27	9	2.49	74
Executive and Legislative support	18	34	20	2	2.08	74
Compatibility with other systems and data	7	29	30	8	2.53	74
Network capacity	13	27	26	8	2.39	74
Providing technology to field offices and field employees	13	27	22	12	2.45	74
Comments about major challenges to improving business applications, including any challenges not listed (optional)						5
Respondents						74

28. Who is the primary decision maker about making improvements in your agency's business applications?

Answer Options	Response Percent	Response Count
You and your staff	83.8%	62
Commonwealth Office of Technology	8.1	6
Other (specify)	8.1	6
Respondents		74

29. Comments about decision making for improvements in business applications (optional)

	Response Count
Respondents	8

30. Indicate how strongly you agree or disagree with the following statement: "The kentucky.gov website effectively presents the agency's mission and identity to the public."

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Rating Average	Response Count
4	4	32	29	5	3.36	74
Comments about kentucky.gov (optional)						11
Respondents						74

31. Does your agency have its own public website?

Answer Options	Response Percent	Response Count
Yes	87.8%	65
No	12.2	9
Respondents		74

32. Rate the importance each of the following public website functions to your agency:

Answer Options	Very Low	Low	Moderate	High	Very High	Rating Average	Response Count
Provide general information about your agency and its services	1	0	2	17	45	4.62	65
Support open government and transparency	1	2	9	27	26	4.15	65
Provide appropriate access to data collected by the agency	2	5	11	24	23	3.94	65
Make forms, documents, and other program materials available electronically	1	1	9	21	33	4.29	65
Promote your agency and its services	1	0	9	20	35	4.35	65
Conduct business with or offer services directly to the public	2	2	15	16	30	4.08	65
Comments about public website functions, including any functions not listed (optional)							7
Respondents							65

33. Rate the performance of your agency's Web presence (with 1=Poor and 5=Excellent).

Answer Options	Response Percent	Response Count
1 - Poor	0.0%	0
2	9.2	6
3	23.1	15
4	43.1	28
5 - Excellent	24.6	16
Comments about the performance of your agency's Web presence (optional)		6
Respondents		65

34. Thinking about all the times you have faced major challenges to improving your agency's Web presence, indicate how often each of the following was a major challenge.

Answer Options	Never A Major Challenge	Seldom A Major Challenge	Sometimes A Major Challenge	Often A Major Challenge	Rating Average	Response Count
Training of users	12	30	16	7	2.28	65
Training of support staff	12	30	18	5	2.25	65
Number of support staff	9	22	23	11	2.55	65
Funding	13	15	18	19	2.66	65
Vendor support	15	24	20	6	2.26	65
Organizational acceptance of change	16	25	19	5	2.20	65
Executive and Legislative support	22	31	10	2	1.88	65
Compatibility with other systems and data	12	33	14	6	2.22	65
Network capacity	16	28	17	4	2.14	65
Providing technology to field offices and field employees	19	30	9	7	2.06	65
Comments about major challenges to improving your agency's Web presence, including any challenges not listed (optional)						3
Respondents						65

35. Who is the primary decision maker about making improvements in your agency's Web presence?

Answer Options	Response Percent	Response Count
You and your staff	89.2%	58
Commonwealth Office of Technology	4.6	3
Other (specify)	6.2	4
Respondents		65

36. Comments about decision making for improvements in your agency's Web presence (optional)

	Response Count
Respondents	4

37. Using the selections below, describe how your agency's information technology is funded, including development, operations, and maintenance.

Answer Options	Response Percent	Response Count
All federal	2.7%	2
Mostly federal, some state	10.8	8
About equally federal and state	6.8	5
Mostly state, some federal	37.8	28
All state	41.9	31
Comments about funding sources for information technology (optional)		23
Respondents		74

38. Describe any issues you see with the current method of funding information and communication technology, and offer any ideas you have for a better process.

	Response Count
Respondents	74

39. Describe any issues you see with the current state of information technology personnel recruitment, hiring, and retention, and offer any ideas you have for a better process.

	Response Count
Respondents	74

40. Describe any issues you see with the current state of information technology purchasing and procurement, and offer any ideas you have for a better process.

	Response Count
Respondents	74

41. Use this space for any additional thoughts about technology at your agency or to convey any comments or criticisms about Kentucky state government's technology resources that, in your opinion, are particularly important, praiseworthy, or troublesome.

	Response Count
Respondents	53

Agencies Surveyed

Response	Count
Complete	74
Partial	6
None	8
Total	88

Source: Program Review staff policy survey.

Cabinet/Branch	Agency	Response
Administrative Office of the Courts	Department of Statewide Services	Complete
Administrative Office of the Courts	Department of Human Resources	Complete
Administrative Office of the Courts	Administrative Office of the Courts	Complete
Administrative Office of the Courts	Department of Family and Juvenile Services	Complete
Administrative Office of the Courts	Department of Administrative Services	Complete
Administrative Office of the Courts	Office of Budget and Policy	Complete
Auditor of Public Accounts	Auditor of Public Accounts	Partial
Cabinet for Economic Development	Cabinet for Economic Development	Complete
Cabinet for Economic Development	Department for Business Development	None
Cabinet for Health and Family Services	Cabinet for Health and Family Services	Complete
Cabinet for Health and Family Services	Commission for Children with Special Health Care Needs	Complete
Cabinet for Health and Family Services	Department for Aging and Independent Living	Complete
Cabinet for Health and Family Services	Department for Behavioral Health, Developmental and Intellectual Disabilities	Complete
Cabinet for Health and Family Services	Department for Community Based Services	None
Cabinet for Health and Family Services	Department for Family Resource Centers and Volunteer Services	Complete
Cabinet for Health and Family Services	Department for Income Support	Complete
Cabinet for Health and Family Services	Department for Medicaid Services	Complete
Cabinet for Health and Family Services	Department for Public Health	None
Cabinet for Health and Family Services	Governor's Office of Electronic Health Information	Complete
Cabinet for Health and Family Services	Kentucky Health Information Exchange	Complete
Cabinet for Health and Family Services	Office of Communications and Administrative Review	Partial
Cabinet for Health and Family Services	Office of Human Resource Management	Complete
Cabinet for Health and Family Services	Office of Inspector General	Complete
Cabinet for Health and Family Services	Office of Ombudsman	Complete
Cabinet for Health and Family Services	Office of Policy and Budget	Partial
Department of Agriculture	Department of Agriculture	Complete

Cabinet/Branch	Agency	Response
Education and Workforce Development Cabinet	Department of Education	Complete
Education and Workforce Development Cabinet	Department for Library and Archives	Complete
Education and Workforce Development Cabinet	Education and Workforce Development Cabinet	Complete
Education and Workforce Development Cabinet	Education Professional Standards Board	Complete
Energy and Environment Cabinet	Department for Energy Development and Independence	Complete
Energy and Environment Cabinet	Department for Natural Resources	Complete
Energy and Environment Cabinet	Department for Environmental Protection	Complete
Energy and Environment Cabinet	Energy and Environment Cabinet	Complete
Energy and Environment Cabinet	Public Service Commission	Complete
Finance and Administration Cabinet	Department of Revenue	Partial
Finance and Administration Cabinet	Finance and Administration Cabinet	Complete
Finance and Administration Cabinet	Office of the Controller	Complete
Finance and Administration Cabinet	Kentucky River Authority	Complete
Finance and Administration Cabinet	Department for Facilities and Support Services	Complete
General Government	Council on Postsecondary Education	Complete
General Government	Department for Local Government	Complete
General Government	Department of Military Affairs	Partial
General Government	Department of Veterans Affairs	Complete
General Government	Kentucky Higher Education Assistance Authority	None
General Government	Kentucky Housing Corporation	Complete
General Government	Kentucky Infrastructure Authority	Complete
General Government	Kentucky Lottery Corporation	Complete
General Government	Kentucky Public Employees' Deferred Compensation Authority	Complete
General Government	Kentucky Retirement Systems	Complete
General Government	Kentucky Teachers' Retirement System	Complete
General Government	Office of Homeland Security	Complete
Justice and Public Safety Cabinet	Department of Corrections	Complete
Justice and Public Safety Cabinet	Department of Criminal Justice Training	Complete
Justice and Public Safety Cabinet	Department of Juvenile Justice	Partial
Justice and Public Safety Cabinet	Department of Public Advocacy	Complete
Justice and Public Safety Cabinet	Judicial Form Retirement System	None
Justice and Public Safety Cabinet	Justice Cabinet	Complete
Justice and Public Safety Cabinet	Kentucky State Police	Complete
Labor Cabinet	Department of Workers' Claims	Complete

Cabinet/Branch	Agency	Response
Labor Cabinet	Department of Workplace Standards	None
Labor Cabinet	Labor Cabinet	Complete
Office of State Budget Director	Office of State Budget Director	None
Office of the Attorney General	Office of the Attorney General	Complete
Office of the Attorney General	Unified Prosecutorial System	Complete
Personnel Cabinet	Department of Employee Insurance	Complete
Personnel Cabinet	Department of Human Resources Administration	Complete
Personnel Cabinet	Personnel Cabinet	Complete
Public Protection Cabinet	Department of Alcoholic Beverage Control	Complete
Public Protection Cabinet	Department of Charitable Gaming	Complete
Public Protection Cabinet	Department of Financial Institutions	Complete
Public Protection Cabinet	Department of Housing, Buildings and Construction	Complete
Public Protection Cabinet	Department of Insurance	Complete
Public Protection Cabinet	Office of Occupations and Professions	Complete
Public Protection Cabinet	Public Protection Cabinet	Complete
Secretary of State	Secretary of State's Office	None
State Treasurer	State Treasury	Complete
Tourism, Arts and Heritage Cabinet	Tourism, Arts and Heritage Cabinet	Complete
Tourism, Arts and Heritage Cabinet	Department of Fish and Wildlife Resources	Complete
Tourism, Arts and Heritage Cabinet	Department of Parks	Complete
Tourism, Arts and Heritage Cabinet	Kentucky Department of Travel and Tourism	Complete
Tourism, Arts and Heritage Cabinet	Kentucky Horse Park	Complete
Tourism, Arts and Heritage Cabinet	Kentucky State Fair Board	Complete
Transportation Cabinet	Department of Aviation	Complete
Transportation Cabinet	Department of Highways	Complete
Transportation Cabinet	Department of Rural and Municipal Aid	Complete
Transportation Cabinet	Department of Vehicle Regulation	Complete
Transportation Cabinet	Transportation Cabinet	Complete

Note: Where the cabinet/branch and agency names are the same, the survey response was for the cabinet or branch as a whole. The survey was sent to both levels.
Source: Program Review staff policy survey.

Appendix D

Technical Survey

Summary Of Survey Responses

1. Select the statement that best describes how your agency reviews and revises its business processes. This includes both manual and automated procedures.

Answer Options	Response Percent	Response Count
Review and revise business processes on a regular schedule and in coordination with technology planning.	29.5%	23
Review and revise business processes on a regular schedule.	7.7	6
Review and revise business processes when technology changes are made.	11.5	9
Review and revise business processes when needed.	51.3	40
Comments about business process planning (optional)		9
Respondents		78

2. Which of the following groups are typically involved in business process planning at your agency? (select all that apply)

Answer Options	Response Percent	Response Count
Department leadership	93.6%	73
Program managers	69.2	54
COT representatives	23.1	18
Program staff	53.8	42
Administrative support staff	34.6	27
Cabinet secretaries	11.5	9
Outside experts	20.5	16
Agency IT staff	53.8	42
Clients/consumers	17.9	14
Governor’s Office	2.6	2
Field staff	32.1	25
Agency IT leadership	51.3	40
Community groups	6.4	5
Other agencies	11.5	9
Other (specify)	15.4	12
Respondents		78

Note: Response percentages total more than 100 and the response count is greater than the total of individual responses because respondents could select more than one response.

3. Select the statement that best describes the overall environment of your agency's current technology infrastructure.

Answer Options	Response Percent	Response Count
Infrastructure components were procured independently ("siloed"), limiting compatibility with other components and requiring an ongoing investment in multiple types of software, hardware, and support staff.	6.5%	5
Some infrastructure components remain independent, while others were procured for compatibility and sharing of support staff.	36.4	28
Infrastructure components were procured for compatibility and sharing of support staff.	45.5	35
If your current agency infrastructure environment differs from the above 3 options please describe below.	11.7	9
Respondents		77

4. Thinking about all the times you have faced major challenges to improving your agency's technology equipment, indicate how often each of the following was a major challenge.

Answer Options	Never A Major Challenge	Seldom A Major Challenge	Sometimes A Major Challenge	Often A Major Challenge	Rating Average	Response Count
Training of users	14	34	22	7	2.29	77
Training of support staff	21	35	17	4	2.05	77
Number of support staff	13	21	25	16	2.60	77
Funding	4	12	34	27	3.09	77
Vendor support	15	32	27	3	2.23	77
Organizational acceptance of change	10	39	23	5	2.30	77
Executive and Legislative support	23	33	19	2	2.00	77
Compatibility with other systems and data	12	37	21	7	2.30	77
Network capacity	14	32	23	8	2.32	77
Providing technology to field offices and field employees	22	26	20	9	2.21	77
Comments about major challenges to improving business applications, including any challenges not listed (optional)						14
Respondents						77

5. Desktop/Workstation Computers Including Operating Systems & Office Productivity Suites

Answer Options	Very Low	Low	Moderate	High	Very High	Rating Average	Response Count
Effectiveness (Does what it is intended to do)	0	0	14	46	17	4.04	77
Efficiency (Saves time and effort)	0	3	14	47	13	3.91	77
Ease of use (Is easy to learn and use)	0	0	19	48	10	3.88	77
Reliability (Rarely malfunctions or has service outage)	0	1	27	42	7	3.71	77
Up to date (Is current enough to meet agency needs)	0	7	25	35	10	3.62	77
User satisfaction (Feedback from users is positive)	0	5	20	47	5	3.68	77
Technical support (Support staff and resources are effective)	0	2	34	33	8	3.61	77
Respondents							77

6. Local Networks, Servers, and Data Storage

Answer Options	Very Low	Low	Moderate	High	Very High	Rating Average	Response Count
Effectiveness (Does what it was intended to do)	0	2	22	42	11	3.81	77
Efficiency (Saves time and effort)	1	3	20	45	8	3.73	77
Ease of use (Is easy to learn and use)	0	1	29	41	6	3.68	77
Reliability (Rarely malfunctions or has service outage)	2	4	33	32	6	3.47	77
Up to date (Is current enough to meet agency needs)	1	4	24	41	7	3.64	77
User satisfaction (Feedback from users is positive)	0	5	35	34	3	3.45	77
Technical support (Support staff and resources are effective)	0	8	31	32	6	3.47	77
Respondents							77

7. Communications Technology: Including traditional phone systems, PBX, Voice over Internet Protocol (VoIP), cell and satellite phones, radio, teleconferencing, etc.

Answer Options	Very Low	Low	Moderate	High	Very High	Rating Average	Response Count
Effectiveness (Does what it was intended to do)	0	6	16	47	8	3.74	77
Efficiency (Saves time and effort)	0	10	13	46	8	3.68	77
Ease of use (Is easy to learn and use)	0	7	19	45	6	3.65	77
Reliability (Rarely malfunctions or has service outage)	1	8	16	47	5	3.61	77
Up to date (Is current enough to meet agency needs)	5	8	18	42	4	3.42	77
User satisfaction (Feedback from users is positive)	2	9	25	37	4	3.42	77
Technical support (Support staff and resources are effective)	0	10	24	37	6	3.51	77
Respondents							77

8. Internet Access

Answer Options	Very Low	Low	Moderate	High	Very High	Rating Average	Response Count
Effectiveness (Does what it was intended to do)	1	1	22	42	11	3.79	77
Efficiency (Saves in amount of time and effort expended)	1	3	20	40	13	3.79	77
Ease of use (Is easy to learn and use)	1	0	13	50	12	3.96	77
Reliability (Rarely malfunctions or has service outage)	1	4	29	37	5	3.56	77
User satisfaction (Feedback from users is positive)	1	2	28	40	6	3.62	77
Technical support (Support staff and resources are effective)	1	2	29	38	7	3.62	77
Respondents							77

9. Comments on agency technology infrastructure. (optional)

	Response Count
Respondents	20

10. Rate the performance of the eMARS statewide accounting system on the following criteria.

Answer Options	Very Low	Low	Moderate	High	Very High	N/A	Rating Average	Response Count
Importance to the agency	0	0	6	9	55	7	4.70	77
Effectiveness in meeting current business needs	1	1	18	32	18	7	3.93	77
Efficiency (Saves time and effort)	1	5	19	31	13	8	3.72	77
Ease of use (Is easy to learn and use)	2	8	35	16	8	8	3.29	77
Up to date (Is current enough to meet agency needs)	1	3	25	27	13	8	3.70	77
Reliability (Rarely malfunctions or has service outage)	1	5	25	26	12	8	3.62	77
Compatibility (Works well with other applications)	2	10	29	18	6	12	3.25	77
User satisfaction (Feedback from users is positive)	2	5	33	23	6	8	3.38	77
Technical support (Support staff and resources are effective)	1	4	23	30	9	10	3.63	77
Given the above ratings, describe any benefits or challenges your agency has experienced regarding eMARS (optional).								23
Respondents								77

11. Rate the performance of the KHRIS statewide personnel and payroll system on the following criteria.

Answer Options	Very Low	Low	Moderate	High	Very High	N/A	Rating Average	Response Count
Importance to the agency	0	3	9	18	39	8	4.35	77
Effectiveness in meeting current business needs	2	8	25	25	8	9	3.43	77
Efficiency (Saves time and effort)	2	11	23	28	4	9	3.31	77
Ease of use (Is easy to learn and use)	6	8	31	20	3	9	3.09	77
Up to date (Is current enough to meet agency needs)	3	6	24	27	8	9	3.46	77
Reliability (Rarely malfunctions or has service outage)	2	4	20	32	9	10	3.63	77
Compatibility (Works well with other applications)	4	12	20	20	5	16	3.16	77
User satisfaction (Feedback from users is positive)	5	11	23	25	4	9	3.18	77
Technical support (Support staff and resources are effective)	4	9	26	22	5	11	3.23	77
Given the above ratings, describe any benefits or challenges your agency has experienced regarding KHRIS (optional).								23
Respondents								77

12. Select the statement that best describes the overall environment of your agency's current business applications.

Answer Options	Response Percent	Response Count
Business applications are built independently ("siloed"), limiting their ability to share information with other applications and requiring an ongoing investment in multiple types of software, hardware, and support staff.	11.8%	9
Some business applications remain independent, while others are built to share information and use compatible software, hardware, and support staff.	40.8	31
Business applications are built to share information and use compatible software, hardware, and support staff.	38.2	29
If your current agency application environment differs from the above 3 options please describe below.	9.2	7
Respondents		76

13. Thinking about all the times you have faced major challenges to improving your agency's business applications, indicate how often each of the following was a major challenge.

Answer Options	Never A Major Challenge	Seldom A Major Challenge	Sometimes A Major Challenge	Often A Major Challenge	Rating Average	Response Count
Training of users	10	31	26	8	2.43	75
Training of support staff	14	38	20	3	2.16	75
Number of support staff	8	24	36	7	2.56	75
Funding	6	13	30	26	3.01	75
Vendor support	14	40	20	1	2.11	75
Organizational acceptance of change	11	38	22	4	2.25	75
Executive and Legislative support	21	34	17	3	2.03	75
Compatibility with other systems and data	13	26	32	4	2.36	75
Network capacity	17	30	25	3	2.19	75
Providing technology to field offices and field employees	20	28	19	8	2.20	75
Comments about major challenges to improving business applications, including any challenges not listed (optional)						14
Respondents						75

14. Well-Performing Application (please exclude KHRIS and eMARS)

	Response Count
Respondents	66

15. What function does [the well-performing application] serve?

Answer Options	Response Percent	Response Count
Performs or assists with the core agency mission	69.7%	46
Performs or assists with agency administration	13.6	9
Other (please specify)	16.7	11
Respondents		66

16. How many years has [the well-performing application] been in service?

	Average	Response Count
Years	9.1	66
Respondents		66

17. Does [the well-performing application] interact directly with the public, is it for internal use, or does it serve both functions?

Answer Options	Response Percent	Response Count
Interacts directly with the public	6.1%	4
Internal use	45.5	30
Serves both functions	48.5	32
Comments on usage of [the well-performing application] (optional)		16
Respondents		66

18. How was [the well-performing application] developed? (Select all that apply)

	This Agency	Affiliated Agency	COT	Outside Vendor (Custom)	Outside Vendor (Off The Shelf)	Response Count
Developed by	32	4	7	24	15	66
Comments about the development of [the well-performing application] (optional)						16
Respondents						66

Note: Response count is greater than the total of individual responses because respondents could select more than one response.

19. How is [the well-performing application] supported/maintained? (select all that apply)

	This Agency	Affiliated Agency	COT	Outside Vendor	Response Count
Supported/maintained by	46	8	16	26	66
Comments about the support of [the well-performing application]. (optional)					14
Respondents					66

Note: Response count is greater than the total of individual responses because respondents could select more than one response.

20. In which of the following areas does [the well-performing application] particularly excel? (select all that apply)

Answer Options	Response Percent	Response Count
Effectiveness (Does what it is intended to do)	95.5%	63
Efficiency (Saves time and effort)	89.4	59
Ease of use (Is easy to learn and use)	65.2	43
Up to date (Is current enough to meet agency needs)	74.2	49
Reliability (Rarely malfunctions or has service outage)	71.2	47
Security (Is secure from internal or external attack)	71.2	47
Business flexibility (Able to adapt to changing business needs)	56.1	37
Technology flexibility (Able to adapt to changing technology)	51.5	34
Operating capacity (Has sufficient capacity for current and planned operations)	72.7	48
Support services (Adequate user support is provided)	57.6	38
Compatibility (Is compatible with other agency applications)	45.5	30
User satisfaction (Feedback from users is positive)	63.6	42
Technical support (Support staff and resources)	59.1	39
Comments on areas in which [the well-performing application] excels. (optional)		9
Respondents		66

Note: Response percentages total more than 100 and the response count is greater than the total of individual responses because respondents could select more than one response.

21. If your agency has ever submitted a proposal to the Capital Planning Advisory Board for replacement or upgrade of [the well-performing application], enter the title of the most recent proposed project here. (optional)

	Response Count
Respondents	11

22. Thinking about the planning, development / procurement, and implementation of [the well-performing application], what decisions, actions, and other factors contributed to its success?

	Response Count
Respondents	66

Poorly Performing Applications (please exclude KHRIS and eMARS)

Question	Response Count
23. Poorly Performing Application 1	33
33. Poorly Performing Application 2	7
43. Poorly Performing Application 3	4
Responses	44
Respondents	33

Note: Numbers represent valid responses to each question.

24., 34., 44. What function does [the poorly performing application] serve?

Answer Options	Response Percent	Response Count
Performs or assists with the core agency mission	56.8%	25
Performs or assists with agency administration	20.5	9
Other (please specify)	22.7	10
Responses		44

25., 35., 45. How many years has [the poorly performing application] been in service?

	Average	Response Count
Years	11.0	44
Responses		44

26., 36., 46. Does [the poorly performing application] interact directly with the public, is it for internal use, or does it serve both functions?

Answer Options	Response Percent	Response Count
Interact directly with the public	6.8%	3
Internal use	54.5	24
Serves both functions	38.6	17
Comments on the usage of [the poorly performing application] (optional)		30
Responses		44

27., 37., 47. How was [the poorly performing application] developed? (select all that apply)

	This Agency	Affiliated Agency	COT	Outside Vendor (Custom)	Outside Vendor (Off The Shelf)	Response Count
Developed by (%)	17	7	8	13	7	44
Comments about the development of [the poorly performing application] (optional)						34
Responses						44

Note: Response count is greater than the total of individual responses because respondents could select more than one response.

28., 38., 48. How is [the poorly performing application] supported / maintained? (select all that apply)

	This Agency	Affiliated Agency	COT	Outside Vendor	Response Count
Supported/Maintained by	21	11	13	10	44
Comments about the support of [the poorly performing application] (optional)					32
Responses					44

Note: Response count is greater than the total of individual responses because respondents could select more than one response.

29., 39., 49. In which of the following areas has [the poorly performing application] been especially problematic? (select all that apply)

Answer Options	Response Percent	Response Count
Effectiveness (Does what it is intended to do)	40.9%	18
Efficiency (Saves time and effort)	54.5	24
Ease of use (Is easy to learn and use)	43.2	19
Up to date (Is current enough to meet agency needs)	52.3	23
Reliability (Rarely malfunctions or has service outage)	31.8	14
Security (Is secure from internal or external attack)	6.8	3
Business flexibility (Able to adapt to changing business needs)	59.1	26
Technology flexibility (Able to adapt to changing technology)	52.3	23
Operating capacity (Has sufficient capacity for current and planned operations)	27.3	12
Support services (Adequate user support is provided)	31.8	14
Compatibility (Is compatible with other agency applications)	54.5	24
User satisfaction (Feedback from users is positive)	47.7	21
Technical support (Support staff and resources are effective)	29.5	13
Responses		44

Note: Response percentages total more than 100 and the response count is greater than the total of individual responses because respondents could select more than one response.

30., 40., 50. Thinking about the planning, development / procurement, and implementation of [the poorly performing application], what decisions, actions, and other factors led to its poor performance, and what might have been done differently to produce a better outcome?

	Response Count
Responses	44

31., 41., 51. If your agency has submitted a proposal to the Capital Planning Advisory Board for replacement or upgrade of [the poorly performing application], enter the title of the proposed project here. (optional)

	Response Count
Responses	10

52. Indicate how strongly you agree or disagree with the following statement: "The kentucky.gov website adequately presents the agency's mission and identity to the public."

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	Rating Average	Response Count
4	6	26	30	8	3.43	74
Comments about kentucky.gov (optional)						15
Respondents						74

53. Does your agency have a public website?

Answer Options	Response Percent	Response Count
Yes	97.3%	72
No	2.7	2
Respondents		74

54. Rate the importance of each of the following public website functions to your agency.

Answer Options	Very Low	Low	Moderate	High	Very High	Rating Average	Response Count
Providing general information about your agency and its services	0	0	6	20	46	4.56	72
Supporting open government and transparency	1	3	12	24	32	4.15	72
Providing appropriate access to data collected by the agency	3	1	10	30	28	4.10	72
Making forms, documents, and other program materials available electronically	1	3	4	22	42	4.40	72
Promoting your agency and its services	0	2	6	25	39	4.40	72
Conducting business with or offering services directly to the public	3	5	4	24	36	4.18	72
Comments about public website functions, including any functions not listed (optional)							8
Respondents							72

55. In what year did your agency's Web presence most recently experience a major design update?

	Median	Response Count
Year	2011	71
Respondents		71

56. Rate the performance of your agency's public website along the following criteria.

Answer Options	Very Low	Low	Moderate	High	Very High	N/A	Rating Average	Response Count
Providing general information about the your agency and its services	1	0	9	23	39	0	4.38	72
Supporting open government and transparency	1	2	16	21	28	4	4.07	72
Providing appropriate access to data collected by the agency	2	3	15	20	29	3	4.03	72
Making forms, documents, and other program materials available electronically.	2	4	7	19	39	1	4.25	72
Promoting your agency and its services	0	2	11	19	40	0	4.35	72
Conducting business with or offering services directly to the public	2	6	14	14	32	4	4.00	72
Providing a high level of end user satisfaction	2	3	8	30	28	1	4.11	72
Providing effective technical support	2	4	21	18	21	6	3.79	72
Comments about public website performance, including any functions not listed (optional)								12
Respondents								72

57. Please describe the reasons your agency does not have a public website.

	Response Count
Respondents	2

58. Thinking of all the hardware and software security tools along the path from the Internet gateway to the local network to individual devices, rate IT security on the following criteria.

Answer Options	Very Low	Low	Moderate	High	Very High	Rating Average	Response Count
Effectiveness (Does what it is intended to do)	1	1	16	44	12	3.88	74
Efficiency (Saves time and effort)	0	2	23	41	8	3.74	74
Ease of use (Is easy to learn and use)	0	1	31	37	5	3.62	74
Reliability (Rarely malfunctions or has service outage)	0	1	18	46	9	3.85	74
Up to date (Is current enough to meet agency needs)	1	1	24	39	9	3.73	74
User satisfaction (Feedback from users is positive)	0	2	24	40	8	3.73	74
Technical support (Support staff and resources are effective)	1	1	28	34	10	3.69	74
Respondents							74

59. List any security incidents your agency has experienced within the past 5 years that would have required reporting under House Bill 5 of the 2014 General Assembly.

	Response Count
Respondents	73

60. Describe below any security measures or policies used at your agency that are designed to ensure that appropriate public access to information is maximized while also maintaining data security and meeting privacy concerns.

	Response Count
Respondents	73

61. Is your agency able to determine its IT expenditures easily and accurately?

Answer Options	Response Percent	Response Count
Yes	67.6%	50
No	32.4	24
Respondents		74

62. From the agency staff's experience with tracking IT expenditures, describe any impediments to easy and accurate IT accounting and offer any ideas for better approaches to IT accounting across state government.

	Response Count
Respondents	74

63. From the perspective of agency staff and management, describe any issues with the current method of budgeting and funding for IT and offer any ideas for a better process.

	Response Count
Respondents	74

64. From the perspective of agency staff and management, describe any issues with the current state of IT personnel recruitment, hiring, and retention, and offer any ideas for a better process.

	Response Count
Respondents	74

65. From the perspective of agency staff and management, describe any issues with the current state of IT purchasing and procurement, and offer any ideas for a better process.

	Response Count
Respondents	74

66. From the perspective of agency staff and management, describe any thoughts on the pros and cons of the consolidation of IT resources in a central agency.

	Response Count
Respondents	74

67. Use this space for any additional thoughts about information and communication technology at your agency or to convey any comments or criticisms about Kentucky state government's technology resources that seem particularly important, praiseworthy, or troublesome. (optional)

	Response Count
Respondents	44

Agencies Surveyed

Response	Count
Complete	73
Partial	5
None	14
Total	92

Note: One partial response included answers to several of the final questions, so 74 rather than 73 respondents completed those questions.
Source: Program Review staff policy survey.

Cabinet/Branch	Agency	Response
Administrative Office of the Courts	Dept. of Administrative Services	Complete
Administrative Office of the Courts	Dept. of Family and Juvenile Services	Complete
Administrative Office of the Courts	Dept. of Human Resources	Complete
Administrative Office of the Courts	Dept. of Technology	Complete
Administrative Office of the Courts	Division of Court Interpreting	Partial
Administrative Office of the Courts	Division of Judicial Branch Education	Partial
Administrative Office of the Courts	Division of Research and Statistics	None
Administrative Office of the Courts	Office of Budget and Policy	Complete
Administrative Office of the Courts	Office of Shared Services	None
Administrative Office of the Courts	Office of Statewide Services	Partial
Auditor of Public Accounts	Auditor of Public Accounts	None
Cabinet for Economic Development	Cabinet for Economic Development	Complete
Cabinet for Health and Family Services	Dept. for Behavioral Health, Developmental and Intellectual Disabilities	Complete
Cabinet for Health and Family Services	Commission for Children with Special Health Care Needs	Complete
Cabinet for Health and Family Services	Dept. for Aging and Independent Living	Complete
Cabinet for Health and Family Services	Dept. for Community Based Services	None
Cabinet for Health and Family Services	Dept. for Income Support	Complete
Cabinet for Health and Family Services	Dept. for Medicaid Services	None
Cabinet for Health and Family Services	Dept. for Public Health	None
Cabinet for Health and Family Services	Governor's Office of Electronic Health Information	Complete
Cabinet for Health and Family Services	Office of Administration and Technology Services	Partial
Cabinet for Health and Family Services	Office of Health Policy	None
Cabinet for Health and Family Services	Office of Inspector General	Complete
Cabinet for Health and Family Services	Office of Ky. Health Benefit Exchange	None
Cabinet for Health and Family Services	Office of Ombudsman	Complete
Cabinet for Health and Family Services	Office of Policy and Budget	Complete
Dept. of Agriculture	Dept. of Agriculture	Complete

Cabinet/Branch	Agency	Response
Education and Workforce Development Cabinet	Commission on Deaf and Hard of Hearing	Complete
Education and Workforce Development Cabinet	Dept. for Libraries and Archives	Complete
Education and Workforce Development Cabinet	Dept. of Workforce Investment	Complete
Education and Workforce Development Cabinet	Education Professional Standards Board	Complete
Education and Workforce Development Cabinet	Kentucky Center for Education and Workforce Statistics	Complete
Education and Workforce Development Cabinet	Kentucky Dept. of Education	Complete
Education and Workforce Development Cabinet	Kentucky Educational Television	Complete
Education and Workforce Development Cabinet	Kentucky Environmental Education Council	Complete
Education and Workforce Development Cabinet	Office of Budget and Administration	Complete
Education and Workforce Development Cabinet	Office of Technology Services	Complete
Energy and Environment Cabinet	Dept. for Energy Development and Independence	Complete
Energy and Environment Cabinet	Dept. for Natural Resources	Complete
Energy and Environment Cabinet	Dept. for Environmental Protection	Complete
Energy and Environment Cabinet	Public Service Commission	Complete
Finance and Administration Cabinet	Commonwealth Office of Technology	Partial
Finance and Administration Cabinet	Dept. for Facilities and Support Services	Complete
Finance and Administration Cabinet	Dept. of Revenue	Complete
Finance and Administration Cabinet	Kentucky River Authority	Complete
Finance and Administration Cabinet	Office of Administrative Services	None
Finance and Administration Cabinet	Office of Policy and Audit	Complete
Finance and Administration Cabinet	Office of the Controller	Complete
General Government	Council on Postsecondary Education	None
General Government	Dept. for Local Government	Complete
General Government	Dept. of Military Affairs	Complete
General Government	Dept. of Veterans Affairs	Complete
General Government	Governor's Scholars Program	Complete
General Government	Kentucky Higher Education Assistance Authority	Complete
General Government	Kentucky Housing Corporation	None
General Government	Kentucky Infrastructure Authority	Complete
General Government	Kentucky Lottery Corporation	None
General Government	Kentucky Retirement Systems	Complete
General Government	Kentucky Teachers' Retirement System	Complete

Cabinet/Branch	Agency	Response
General Government	Kentucky Board of Medical Licensure	Complete
General Government	Kentucky Board of Nursing	Complete
General Government	Kentucky Commission on Proprietary Education	Complete
General Government	Office of Homeland Security	Complete
Justice and Public Safety Cabinet	Dept. of Corrections	Complete
Justice and Public Safety Cabinet	Dept. of Criminal Justice Training	Complete
Justice and Public Safety Cabinet	Dept. of Juvenile Justice	Complete
Justice and Public Safety Cabinet	Dept. of Public Advocacy	Complete
Justice and Public Safety Cabinet	Kentucky State Police	Complete
Labor Cabinet	Dept. of Workers' Claims	Complete
Office of the Attorney General	Office of the Attorney General	Complete
Office of the Attorney General	Unified Prosecutorial System	Complete
Personnel Cabinet	Dept. of Employee Insurance	Complete
Personnel Cabinet	Dept. of Human Resources Administration	Complete
Public Protection Cabinet	Dept. of Alcoholic Beverage Control	Complete
Public Protection Cabinet	Dept. of Charitable Gaming	Complete
Public Protection Cabinet	Dept. of Financial Institutions	Complete
Public Protection Cabinet	Dept. of Housing, Buildings and Construction	Complete
Public Protection Cabinet	Dept. of Insurance	Complete
Public Protection Cabinet	Kentucky Horse Racing Commission	Complete
Public Protection Cabinet	Office of Occupations and Professions	Complete
Secretary of State	Secretary of State	None
State Treasurer	State Treasury	Complete
Tourism, Arts and Heritage Cabinet	Dept. of Fish and Wildlife Resources	Complete
Tourism, Arts and Heritage Cabinet	Dept. of Parks	Complete
Tourism, Arts and Heritage Cabinet	Kentucky Dept. of Travel and Tourism	Complete
Tourism, Arts and Heritage Cabinet	Kentucky Horse Park	None
Tourism, Arts and Heritage Cabinet	Kentucky State Fair Board	Complete
Tourism, Arts and Heritage Cabinet	Kentucky Artisans Center at Berea	Complete
Tourism, Arts and Heritage Cabinet	Kentucky Arts Council	Complete
Tourism, Arts and Heritage Cabinet	Kentucky Heritage Council	Complete
Tourism, Arts and Heritage Cabinet	Kentucky Historical Society	Complete
Transportation Cabinet	Transportation Cabinet	Complete

Source: Program Review staff technical survey.

Appendix E

Capital Planning In Other States

Virginia

In 2003 the Virginia Joint Legislative Audit and Review Commission recommended a process for prioritizing state IT projects. Accordingly, the legislature (in cooperation with the Joint Legislative Audit and Review Commission) created a process whereby a special independent board reviewed, prioritized and reported on IT projects.[83] These reports were sent to the governor and legislature with the intention of informing budget decisions. In addition to creating a review board, the legislature created a fund to allocate money for high-priority projects.

While prioritizing IT projects with a designated funding source appeared to be a good idea, putting it into practice turned out to be problematic. Virginia agencies control their own budgets for IT investment because most agency funding comes from dedicated revenues (restricted funds) or federal funds. Shifting money between agencies is nearly impossible.[84] Decision making with regard to IT project prioritization therefore occurs at the agency level and is based on agency-specific budgets. According to an official at Virginia's Joint Legislative Audit and Review Commission, prioritization of IT projects across all Virginia agencies, considered as a whole, simply does not happen.[85]

Arguably a greater impediment to statewide IT project prioritization is the lack of dedicated funding. The legislature did create a central fund with the explicit purpose of paying for high-priority IT projects across all agencies; ultimately money was never allocated to this fund. Since money could not be shifted across agencies and the central fund remained empty, prioritization efforts never came to fruition.

Reporting IT project priorities continued until 2012 or 2013, at which time it was discontinued. During the period when the report was actually produced, its value was only partial. Actual priorities failed to be meaningfully met because of a lack of funding.[86]

IT project appropriations do not receive line item designations. In the Virginia budget bill (passed every year) all major IT projects are listed for information purposes only under the central IT authority, Virginia Information Technologies Agency (VITA).[87] Actual IT project appropriations are contained within each agency's budget but are not broken out as line items.

Oversight of major IT projects falls mostly within the purview of the secretary of technology but also includes VITA, the CIO, and the Information Technology Advisory Council. The powers and duties of each IT oversight entity are spelled out in the Virginia Code (Va. Code Ann. Secs. 2.2-2007 to 2.2-2699.6). IT oversight is comprehensive, from planning and development to annual reviews of application budgets. Major IT projects can be disapproved at the recommendation of the CIO to the secretary of technology. "Major information technology projects" are defined in the Code of Virginia as projects with a total estimated cost greater than $1 million. Additionally, the secretary of technology may designate a project with a total

estimated cost of less than $1 million as a "major information technology project" for any of the following reasons:

- The project has high risk or high complexity.
- The project is critical to the immediate security or safety of commonwealth citizens.
- The project is a component of a larger commonwealth IT program.
  The governor has requested additional oversight of the project (Va. Code Ann. Secs. 2.2-2007 to 2.2-2699.6).

North Carolina

North Carolina plans and finances state IT resources through its chief information officer. The CIO is responsible for developing a biennial state IT plan. The state IT plan comprises the individual IT plans of each executive branch agency. Agency IT plans are reviewed by the CIO and consolidated into the state IT plan. The General Assembly takes up the state IT plan during each regular session.

Legislative oversight of IT projects is nominal, although issues related to security policies and standards appear to receive some legislative input. That is to say, security measures brought to the General Assembly may require some form of legislative approval before being altered or implemented. The body associated with legislative oversight of IT projects is the Joint Legislative Oversight Committee on Information Technology.

The state CIO has legislative oversight authority to review and approve state agency IT projects; to develop standards and accountability measures for IT projects (including criteria for adequate project management); to require status reporting; to assign a project management adviser; and, if necessary, to suspend projects. The purpose of this legislation is to help to ensure that high-quality IT projects are delivered in a cost-effective and timely manner.[88]

In principle all IT projects, whether planned or in process, are subject to review by the state CIO. Typically, however, only projects planned to exceed $500,000 require review and approval by the CIO. In certain instances the CIO may find it necessary to review planned IT projects that do not meet the $500,000 threshold. Usually only in cases in which the CIO has determined there to be significant risk or potential budgeting issues are projects under the $500,000 threshold reviewed (N.C. Gen. Stat. Sec. 147-33.72C).

Agencies are not permitted to proceed with IT projects that are subject to review until the CIO has given approval. Approval, once it is given, can also be suspended if the CIO discovers that the project is no longer meeting specifications established in the plan. A suspension of an IT project is immediately reported by the Office of Information Technology Services to the state controller and the Office of State Budget Management so that funds can be withheld until released by the CIO. It is worth mentioning that agencies may appeal the CIO's denial or suspension of an IT project.

Appendix F

Summary Of House Bill 5

In the 2014 Regular Session, the General Assembly passed House Bill 5 to address data breach notifications effective January 1, 2015. It will be codified in KRS 61.931 to 61.934 and 42.726. The law requires subject entities to safeguard personal data, notify specified authorities if breaches occur, and establish reasonable security and breach investigation procedures. If the agency determines misuse of personal information has occurred or is likely to occur, then it must also give notice to individuals whose data has been breached and, for larger breaches, must inform consumer credit reporting agencies.

Notification Of Officials

Entities covered by HB 5 that collect, maintain, or store personal information, upon awareness of a breach, must notify in writing the Kentucky State Police commissioner, the auditor of public accounts, and the attorney general as soon as possible, but within 72 hours. Depending on the type of agency breached, notification must also be made to either the Finance and Administration secretary (or designee), the Department for Local Government commissioner, the Kentucky Department of Education commissioner, or the Council for Postsecondary Education president. If a nonaffiliated third party maintains or possesses personal data on behalf of a state agency and suffers a breach, the party must also notify that state agency of the breach within the 72-hour period.

Investigation

Simultaneously, entities must begin an investigation of the security breach employing procedures and practices developed as outlined in the legislation. For example, executive branch agencies' investigative procedures are to be developed in accordance with COT enterprise policies, local government entities' with Department for Local Government policies, public school districts' with Kentucky Board of Education policies, and public universities' with Council for Postsecondary Education policies. HB 5 also requires COT to give technical assistance, upon agencies' request, in establishing and implementing the security and breach investigation procedures. COT stated that some of the assistance would be covered by an agency's regular support fee, but extensive assistance might result in hourly charges to an agency.[89]

Notification Of Individuals

Upon conclusion of a security breach investigation in which entities determine that misuse of personal information has not occurred or is not likely to occur, notification to individuals is not required, but agencies must maintain records relating to the incident, particularly the basis for the decision not to notify, for a time specified by state law (KRS 171.420). Agencies must notify the

same governmental authorities identified when a breach occurs to communicate that misuse of personally identifying data has not occurred.

If agencies' security breach investigation concludes personal information misuse has occurred or is likely to occur they must, upon investigation completion, notify

- within 48 hours, in writing, all authorities notified of the initial breach and the Kentucky Department for Libraries and Archives commissioner;
- within 35 days all individuals affected by the breach; and
- if the number of affected individuals exceeds 1,000, at least 7 days prior to individual notices, all consumer credit reporting agencies listed with the Kentucky Office of the Attorney General.

Notice to individuals includes conspicuous posting on the agency's website; notice to local, regional, or statewide media, commensurate with the scope of the breach; and personal communication to affected individuals either in writing, by email, or by telephone. The personal communication mode must be that which the agency believes will most likely result in actual notification. The notifying agency must cooperate with any investigation conducted by the Kentucky State Police, the auditor of public accounts, and the attorney general, and with reasonable requests of the Office of Consumer Protection of the Office of the Attorney General, consumer credit reporting agencies, and notice recipients to authenticate the notice (KRS 61.933(2)(c)).

Individual Notice Components

The notice to individuals must contain the following specific information relating to the security breach:

- A description of breached information categories, including personal information elements
- Contact information for the notifying agency
- A description of the agency's general actions to protect information from further breach
- Contact information for the major consumer credit reporting agencies, the Federal Trade Commission, and the Kentucky attorney general to assist individual in avoiding identity theft (KRS 61.933(2)(b))

Exceptions To Notification

Law enforcement can request stays to notification requirements. After consultation with the affected entity, a law enforcement agency may request in writing a delay in notification because the notice might impede a criminal investigation. Delay requests may apply to all or some of the notifications. Notifications resume upon written notice from the law enforcement agency that the criminal investigation is complete or will no longer be impeded by notification requirements (KRS 61.933(3)(a)). An agency's notice to individuals may also be stayed if the agency determines data system integrity cannot be restored within the 35-day time frame allowed for notice. This delay must be approved in writing by the attorney general (KRS 61.933(3)(b)).

Legislative And Judicial Branch Requirements

Under HB 5, the legislative and judicial branches are required to implement and maintain reasonable security and breach procedures consistent with those mandated for other entities in the law (KRS 61.934).

Commonwealth Office Of Technology Requirements

HB 5 mandates include the following COT-specific requirements:

- Provide technical assistance establishing security and breach investigation procedures upon agency request.
- Promulgate administrative regulations to develop security breach agency notification forms and notification delay request (by law enforcement) forms.
- Develop a "coordinated framework" and "model governance structure" for the security of personal information collected and held by executive branch agencies, including
  - identification of key infrastructure components and how to secure them;
  - establishment of a common benchmark that measures the effectiveness of security with ongoing monitoring and automation of defenses;
  - implementation of vulnerability scanning and other security assessments;
  - provision of training, orientation programs, etc. that emphasize personal data security importance among agency employees; and
  - development and availability of a cyber security incident response plan (KRS 42.726).

Enforcement

Under KRS 61.933(6), the attorney general may bring action in the Franklin Circuit Court for those entities failing to meet HB 5 notification requirements. An action for injunctive relief may be brought against agencies and nonaffiliated third parties, and an action for other legal remedies may be brought against a nonaffiliated third party that is not a state agency. HB 5 does not grant private individuals a right to bring suit for damages or for lack of compliance.

Appendix G

Supplemental Accounting Applications

Many agencies have built or purchased applications that perform procurement, payment, inventory, and other accounting functions supplementary to eMARS. The following table provides some examples but is not complete.

Agency Functionality Application Name	Description
• Administrative Office of the Courts • Purchasing • [Unnamed purchase order database application]	Handles requests for purchase of goods from contracts, sends an order by email to the vendor and an email to the receiving user to look for the order, records the partial or complete receipt, and produces tracking reports. None of this information is recorded in eMARS; payments are made via eMARS general accounting transaction payments that do not refer to the contract.[90]
• Administrative Office of the Courts • Inventory • Archibus	Commercial system tracks inventory. Items with value of $5,000 or more are also tracked with the eMARS fixed assets function.[91]
• Commonwealth Office of Technology • Purchasing, inventory • FrontRange HEAT	Commercial IT service management system routes and tracks purchase requests and inventory. It has email reminders for purchase requests. Some information is duplicated in eMARS.[92]
• Department of Education • Procurement • Financial Routing System (FRS)	Routes scanned images of draft requests for proposals and contracts to a list of approvers and tracks their progress, reminding approvers when there is a delay. Draft documents are entered into eMARS, printed, scanned, processed through FRS, modified in eMARS as needed, and then submitted in eMARS for final approval.[93]
• Cabinet for Health and Family Services • Procurement • [Unnamed GenTrack application]	Routes paper copies of draft requests for proposals and contracts to a list of approvers and tracks their progress. A designated staff assistant ensures that approvals are timely. GenTrack is a tracking application developed by the cabinet that is used in a variety of further applications, including this one.[94]

Agency Functionality Application Name	Description
• Cabinet for Health and Family Services • Purchasing, payments, inventory • Procurement, Payables, and Asset Tracking System	Handles requests for purchase of goods from contracts, sends an order by email to the vendor, notes receipt of the order, tracks payments, prints asset tags, tracks the location of inventory, handles asset transfers and disposal, and calculates depreciation. It reminds staff when approvals or other actions are needed. Cabinet staff ensure there are parallel documents in eMARS except for a one-way interface allowing the application to update fixed asset documents in eMARS. COT has begun to use the application and is considering it for use by other agencies.[95]
• State Fair Board • Payments, billing, accounting, inventory • Ungerboeck	Commercial event management application handles payments, billing (receivables), accounting (general ledger), and inventory. Much of the information is duplicated in eMARS.[96]
• Department of Fish and Wildlife Resources • Inventory • [Future application]	System under development would manage and track firearms inventory. The department has asked that it not have to duplicate its inventory in eMARS.[97]

Appendix H

Accounting Object Codes Used For IT Payments

The statewide accounting system, eMARS, provides a way for the state to define several types of accounting codes used to classify documents and transactions in different ways. The primary code used to give the reason for payments and related transactions is the object code.

Table H.1 shows the three object codes associated with the largest dollar amounts on payments to a sample of major IT vendors from FY 2012 to FY 2014.

Table H.1
Top Three Object Codes By IT Grouping For Sampled Payments
Fiscal Year 2012 To Fiscal Year 2014
(In Millions Of Dollars)

Code	Description	FY 2012	FY 2013	FY 2014
	IT Object Codes			
E812	IT Application Development Services	$3.7	$6.8	$8.0
E831	Personal Computer Hardware < $5,000	5.8	6.0	3.6
E710	Computer Equipment	9.0	4.5	0.7
	Non-IT Object Codes			
E146	Consulting Services-1099 Rept	5.6	8.2	9.6
E150	Other Professional Services-1099 Rept	2.3	3.5	10.0
E725	Miscellaneous Expenditure	9.5	3.2	1.0

Note: The Kentucky Health Benefit Exchange excluded, amounts paid by the exchange to these vendors for these IT object codes all rounded to zero; amounts for these non-IT object codes were $46.9 million in FY 2013 and $38.2 million in FY 2014.
Source: Program Review staff sample of eMARS payments to nine large IT vendors.

Table H.2 lists all object codes that the Finance and Administration Cabinet considers information technology object codes. These are codes that are extracted by the cabinet's IT expenditures report 2270 and an additional IT object code.

Table H.2
Object Codes Designated For Information Technology Expenses

Code	Description
E224	Copy Machine Rental-1099 Rept
E225	Compute Rental-Pay T/Vend-1099
E233	Copy Machine Maint-1099 Rept
E300	Internal Enterprise IT Charges
E331	Data Processing Supplies
E338	Copy Machine Supplies
E354*	Expend Rembrsmnt-Mobile Svcs
E631	Personal Computer Hardware > $5,000

Code	Description
E632	Server Hardware > $5,000
E633	Networking Hardware > $5,000
E634	Data Storage Hardware > $5,000
E635	Printers & I/O Hardware > $5,000
E636	Telephone System Hardware - Wireless/Cell > $5,000
E637	Telephone System Hardware - Other > $5,000
E639	Other IT Hardware > $5,000
E710	Computer Equipment
E801	COT Telephone Charges
E802	Other COT Charges
E803	COT Pass Through Charges
E804	#N/A
E806	IT Policy, Planning & Architecture Services
E807	IT Training Services
E808	IT Desktop/Server Management Services
E809	IT Business Applications Services
E810	IT Networking/Infrastructure Services
E811	IT Security Services
E812	IT Application Development Services
E813	IT Operations Services
E814	Telephone Charges - Wireless/Cell
E815	Telephone Charges - Other
E816	Video Teleconferencing Charges
E819	Other IT Services
E820	Operating Systems/Utilities Software
E821	Database Software
E822	Office Software
E823	Business Applications Software
E824	Networking/Infrastructure Software
E825	Security Software
E826	Application Development Software
E827	IT Operations Software
E828	Telephone System Software - Wireless/Cell
E829	Telephone System Software - Other
E830	Other IT Software
E831	Personal Computer Hardware < $5,000
E832	Server Hardware < $5,000
E833	Networking Hardware < $5,000
E834	Data Storage Hardware < $5,000
E835	Printers & I/O Hardware < $5,000
E836	Telephone System Hardware - Wireless/Cell < $5,000
E837	Telephone System Hardware - Other < $5,000
E839	Other IT Hardware < $5,000
E840	Operating Systems/Utilities Software Maintenance

Code	Description
E841	Database Software Maintenance
E842	Office Software Maintenance
E843	Business Applications Software Maintenance
E844	Networking/Infrastructure Software Maintenance
E845	Security Software Maintenance
E846	Application Development Software Maintenance
E847	IT Operations Software Maintenance
E848	Telephone System Software Maintenance - Wireless/Cell
E849	Telephone System Software Maintenance - Other
E850	Other IT Software Maintenance
E851	Personal Computer Hardware Maintenance
E852	Server Hardware Maintenance
E853	Networking Hardware Maintenance
E854	Data Storage Hardware Maintenance
E855	Printers & I/O Hardware Maintenance
E856	Telephone System Hardware Maintenance - Wireless/Cell
E857	Telephone System Hardware Maintenance - Other
E859	Other IT Hardware Maintenance

* E354 was not listed on the 2270 report. It is used to reimburse employees for use of their personal mobile devices.
Sources: eMARS infoAdvantage report 2270; Hicks, John. "LRC Program Review question about eMARS IT object codes." Message to Van Knowles. Sept. 24, 2014. Email.

Endnotes

[1] Couch, David. "LRC question about Munis." Message to Van Knowles. Sept. 4, 2014. Email.
[2] Kentucky. *Innovation in Government: The Kentucky Business One Stop Portal Assessment*. Dec. 2011. Web. Sept. 5, 2014. Pp. 14-17.
[3] Lile, Janet. "COT IT Infrastructure Initiative—4 questions/LRC IT Study." Message to Jean Ann Myatt. Sept. 10, 2014. Email.
[4] Kentucky. Finance and Administration Cabinet. Commonwealth Office of Technology. "I.3-Office of the Attorney General Consolidation Details." n. pag. Sept. 10, 2014. Web. Sept. 11, 2014.
[5] Lile, Janet. "COT IT Infrastructure Initiative—4 questions/LRC IT Study." Message to Jean Ann Myatt. Sept. 10, 2014. Email.
[6] Robb, Charles. "Emailing: LRC - TAC Meeting Summaries.zip." Message to Van Knowles. Sept. 2, 2014. Email.
[7] Pacific Technologies Inc. *Commonwealth of Kentucky Information Technology Assessment*. Bellevue: Pacific Technologies Inc., Aug. 2, 2012. Web. Jan. 24, 2014. Pp. 37-48.
[8] Ibid. P. 12.
[9] Lile, Janet. "LRC Program Review Notes." Message to Van Knowles. Sept. 3, 2014. Email.
[10] Kentucky. Technology Advisory Council. "Meeting Summary [draft]." July 15, 2014. P. 7.
[11] Lile, Janet. "LRC Program Review Notes." Message to Van Knowles. Sept. 3, 2014. Email.
[12] Kentucky. Technology Advisory Council. "Meeting Summary [draft]." July 15, 2014. P. 8.
[13] Kentucky. Finance and Administration Cabinet. Commonwealth Office of Technology. "Technology Advisory Council Charter." Dec. 3, 2013.
[14] Lile, Janet. "LRC Program Review Notes." Message to Van Knowles. Sept. 3, 2014. Email.
[15] National Association of State Chief Information Officers. *Digital States at Risk! Modernizing Legacy Systems.* Dec. 2008. Web. Jan. 10, 2014. P. 3.
[16] Ibid.
[17] Iyer, Venkatraghavan N. "Legacy Modernization and Scale." *Infosys Viewpoint*. 2011. Web. Sept. 23, 2014. P. 1.
[18] Goodchild, Michael F. "Information Technology as Megaengineering: The Impact of GIS." *Engineering Earth: The Impacts of Megaengineering Projects*. Stanley D. Brunn, ed. New York: Springer, 2011. Web. Oct. 14, 2014. P. 38.
[19] Kentucky. Finance and Administration Cabinet. Commonwealth Office of Technology. "Capital Improvements Plan. Information Technology Capital Items." 2013.
[20] Bowen, Shawn. Email to Van Knowles. Sept. 18, 2014.
[21] Kentucky. Finance and Administration Cabinet. Commonwealth Office of Technology. "Capital Improvements Plan. Information Technology Capital Items." 2011; Kentucky. Finance and Administration Cabinet. Commonwealth Office of Technology. "Capital Improvements Plan. Information Technology Capital Items." 2013.
[22] Mallory, Patrick. "Government's Challenge: Building its Crucial IT Workforce." *Governing: The States and Localities*. Jan. 21, 2014. Web. Sept. 30, 2014.
[23] Ibid.
[24] Ibid.
[25] Ibid.
[26] Flanery, Lori. "Finance Recommendations." Message to Van Knowles. Oct. 28, 2014. Email.
[27] Pacific Technologies Inc. *Commonwealth of Kentucky Information Technology Assessment*. Bellevue: Pacific Technologies Inc., Aug. 2, 2012. Web. Jan. 24, 2014. P. E-5.
[28] Ibid., P. 44.
[29] Ibid., P. 28.
[30] Guevara, Jamie K., Linda Hall, and Eric Stegman, "IT Key Metrics Data 2012: Key Industry Measures: Government: State and Local Analysis: Multiyear." N.p.: Gartner, Dec. 15, 2011. P. 17.
[31] Lile, Janet. "LRC Program Review Notes." Message to Van Knowles. Sept. 3, 2014. Email.
[32] Speer, Don. "LRC Program Review question about RFP preparation." Message to Van Knowles. Oct. 1, 2014. Email.
[33] United States. Government Accountability Office. *Critical Factors Underlying Successful Major Acquisitions*. Oct. 2011. Web. Nov. 5, 2014.
[34] Kentucky. Auditor of Public Accounts. *Cyber Security: Pay Now or Pay More Later: A Report on Cyber Security in Kentucky.* Frankfort, Dec. 19, 2013. Web. Sept. 3, 2014. P. 28.

[35] Lykins, Brian. "HB 5 genesis confirmation." Message to Jean Ann Myatt. Nov. 7, 2014. Email.
[36] LeMay, Katrina. "LRC request for information on IT security." Message to Van Knowles. Aug. 28, 2014. Email.
[37] Ibid.
[38] Kentucky. Technology Advisory Council. "Meeting Summary [draft]." July 15, 2014. P. 8.
[39] United States. Government Accountability Office. *Data Breaches Are Frequent, but Evidence of Resulting Identity Theft Is Limited; However, the Full Extent Is Unknown.* Washington: US Government, June 2007. Web. Sept. 29, 2014. P. 20.
[40] Kentucky. Auditor of Public Accounts. *Cyber Security: Pay Now or Pay More Later: A Report on Cyber Security in Kentucky*. Frankfort, Dec. 19, 2013. Web. Sept. 9, 2014. P. 9.
[41] Ibid.
[42] Ibid., P. 10.
[43] Ibid., Pp. 11-12.
[44] Ibid., Pp. 11, 15, 32.
[45] Kentucky. Legislative Research Commission. *Updates from the Capitol: 2014 General Assembly Action – Part II.* n.p. June 25, 2014. P. 1.
[46] Kentucky. Auditor of Public Accounts. *Cyber Security: Pay Now or Pay More Later: A Report on Cyber Security in Kentucky*. Frankfort, Dec. 19, 2013. Web. Sept. 3, 2014. Pp.13-15, 17-22.
[47] Kentucky. Finance and Administration Cabinet. Commonwealth Office of Technology. "Enterprise IT Policy." n.p. July 29, 2014. n.pag. Web. Sept. 19, 2014.
[48] Stinson, Jeffrey. "Cyberattacks on State Databases Escalate." *Stateline*. The Pew Charitable Trusts. Oct. 2, 2014. Web. Oct. 10, 2014; Deloitte and National Association of State Chief Information Officers. *2014 Deloitte-NASCIO Cyber Security Study State governments at risk: Time to move forward.* Oct. 2014. Web. Oct. 2, 2014. Pp. 2-3.
[49] LeMay, Katrina. "LRC request for information on IT security." Message to Van Knowles. Aug. 28, 2014. Email.
[50] Ross, Ed. "Notes from meeting with LRC August 22." Message to Van Knowles. Sept. 16, 2014. Email.
[51] Ibid.
[52] Ross, Ed. "LRC Program Review question-eMARS annual costs." Message to Van Knowles. Sept. 30, 2014. Email.
[53] Ross, Ed. "Notes from meeting with LRC August 22." Message to Van Knowles. Sept. 16, 2014. Email.
[54] Ross, Ed. "LRC Program Review question-eMARS annual costs." Message to Van Knowles. Sept. 30, 2014. Email.
[55] Sweasy, Donald. "LRC information request-eMARS capabilities." Message to Van Knowles. Sept. 18, 2014. Email.
[56] Ross, Ed. "Notes from meeting with LRC August 22." Message to Van Knowles. Sept. 16, 2014. Email.
[57] Ibid.
[58] Ibid.
[59] Ibid.
[60] Aldridge-Montfort, Barbara. "LRC information request-eMARS training/documentation." Message to Van Knowles. Sept. 11, 2014. Email.
[61] Sweasy, Donald. "LRC information request-eMARS capabilities." Message to Van Knowles. Sept. 18, 2014. Email.
[62] Kentucky. Legislative Research Commission. *Personal Service Contracting in Kentucky*. Frankfort: LRC, Nov. 14, 2013. Pp. 32-34, 53-61.
[63] Perkins, Robbie. "Summary of UPPS Flexibility/Compatibility." Message to Joel Thomas. Oct. 10, 2014. Email.
[64] Jurek, Beth. "comments to program review excerpt." Message to Van Knowles. Oct. 22, 2014. Email.
[65] Jurek, Beth. "Seeking Information Regarding KAMES for LRC Study on Technology in KY State Government." Message to Shane Stevens. June 17, 2014. Email.
[66] Jurek, Beth. "Seeking Information Regarding KAMES for LRC Study on Technology in KY State Government." Message to Shane Stevens. June 16, 2014. Email.
[67] United States. Dept. of Health and Human Services. Office of the Assistant Secretary for Planning and Evaluation. *Opportunities under the Affordable Care Act for Human Services Programs to Modernize Eligibility Systems and Expedite Eligibility Determination*. By Stan Dorn and Rebecca Peters. July 21, 2014. Web. Oct. 4, 2014.
[68] Mauer, Paul. "Quick AVIS question." Message to Van Knowles. Nov. 5, 2014. Email.
[69]Mauer, Paul. "AVIS-KAVIS Clarifications." Message to Jean Ann Myatt. July 31, 2014. Email.
[70] Ibid.
[71] Mauer, Paul. "Confirming phone conversation." Message to Van Knowles. Oct. 27, 2014. Email.

[72] Kentucky. Legislative Research Commission. Interim Joint Committee on Transportation. Minutes of the 2nd Meeting of the 2014 Interim. July 1, 2014. Web. Oct. 6, 2014.
[73] Stout, Heather. "Program Review Draft." Message to Van Knowles. Oct. 29, 2014. Email.
[74] Hawkins, Carla. "COT Application Portfolio." Message to Van Knowles. Feb. 3, 2014. Email.
[75] Lile, Janet. "LRC Program Review question about staffing." Message to Van Knowles. Sept. 10, 2014. Email.
[76] Pacific Technologies Inc. *Commonwealth of Kentucky Information Technology Assessment*. Bellevue: Pacific Technologies Inc., Aug. 2, 2012. Web. Jan. 24, 2014. Pp. 27-28.
[77] "Smart Government Initiative: IT Work Group Financial Reporting and Coding Subgroup." 2010. Message from John Hicks to Van Knowles. Sept. 3, 2014. Email.
[78] North Carolina. Office of the State Controller. Office of State Budget and Management. *Information Technology Expenditures Report For the Period Ended June 30, 2011*. October 1, 2011. Web. Sept. 9, 2014. P. 2.
[79] Pacific Technologies Inc. *Commonwealth of Kentucky Information Technology Assessment*. Bellevue: Pacific Technologies Inc., Aug. 2, 2012. Web. Jan. 24, 2014. P. E-7.
[80] "Smart Government Initiative: IT Work Group Financial Reporting and Coding Subgroup." 2010. Message from John Hicks to Van Knowles. Sept. 3, 2014. Email.
[81] Kentucky. Finance and Administration Cabinet. Customer Resource Center. *EMARS 111 Chart of Accounts/Budget and Cash Control*. Web. July 17, 2014. P. 9.
[82] "Smart Government Initiative: IT Work Group Financial Reporting and Coding Subgroup." 2010. Message from John Hicks to Van Knowles. Sept. 3, 2014. Email.
[83] Gribbin, Mark. "[nlpes-l] Seeking information about IT project planning/oversight." Message to Joel Thomas. May 8, 2014. Email.
[84] Ibid.
[85] Ibid.
[86] Ibid.
[87] Ibid.
[88] North Carolina. Office of the State Chief Information Officer. Enterprise Management Office. "Our Primary Mission." 2010. Web. May 15, 2014.
[89] LeMay, Katrina. "LRC request for information on IT security." Message to Van Knowles. Aug. 22, 2014. Email.
[90] Brown, Leslie, Alisha Jeter, and Mark Hinton. Administrative Office of the Courts. Personal interview. July 15, 2014.
[91] Ibid.
[92] Lile, Janet. Executive dir., Office of Enterprise Technology, Commonwealth Office of Technology. Personal interview. Aug. 12, 2014.
[93] Harman, Charles, and Jason Camden. Division of Budget and Financial Management, Dept. of Education. Personal interview. April 29, 201.
[94] Watkins, Jackie, and Andy Crumbacker. Office of Policy and Budget, Cabinet for Health and Family Services. Personal interview. May 2, 2013.
[95] Ammons, Chuck, et al. Division of Facilities Management, Cabinet for Health and Family Services. Personal interview. Aug. 14, 2014; Kentucky. Cabinet for Health and Family Services. Office of Administrative and Technology Services. "Procurement, Payables, & Asset Tracking System." Aug. 14, 2014.
[96] Kevin Moore. State Fair Board. Personal interview. July 31, 2014.
[97] Bruce, David. Assistant dir., Dept. of Fish and Wildlife Resources. "LRC follow-up." Message to Van Knowles. Aug. 20, 2014. Email.