Education Technology Master Plan:

Appendices

Appendix A:

Planning Participation and Process

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KDE would like to offer a very special thanks to all the teachers, students and parents who provided input into the Master Plan.

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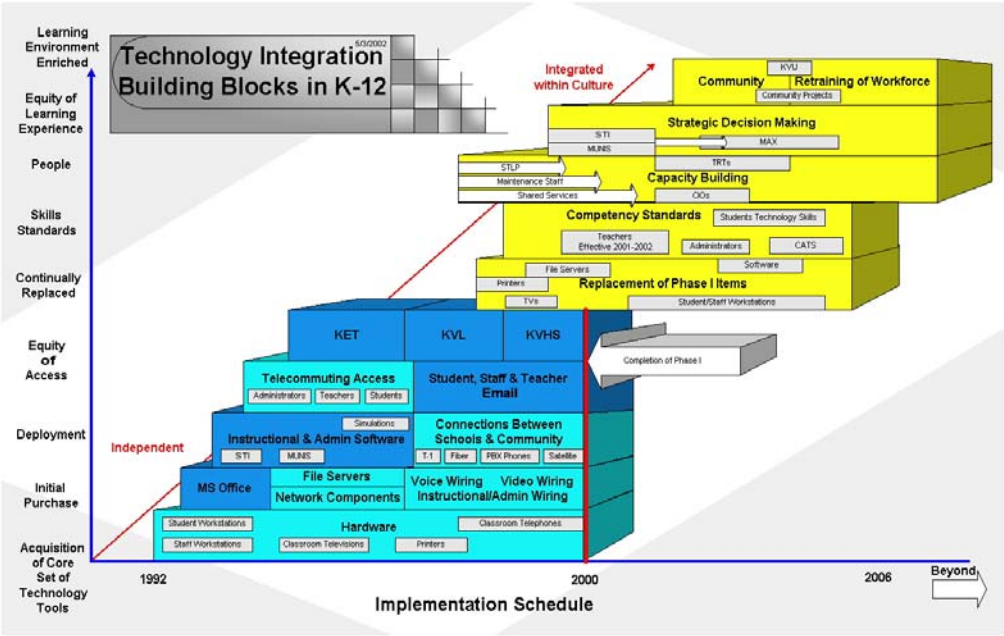
Previous Technology Master Plans



Technology Integration Building Blocks

Phase 1 (1992-2000) and Phase 2 (2001-2006) Accomplishments

The Milken Foundation, MGT of America Study and *Education Week* rate Kentucky as one of the best states in making a difference and adding value to the instructional process through its investment in technology.

A study by the Kentucky Long Term Research Center says that the investment in KETS is effective in improving students' technology literacy and preparing them for the workforce in an equitable manner. KETS was listed as the state's top economic development initiative. In addition, two separate surveys on attitudes toward technology by teachers, principals, superintendents, school council parents, school board members and the public were all positive. In 2006, Kentucky was ranked fifth overall in the nation, according to *Education Week,* in leadership in the area of P-12 education technology. This included use, capacity and access. Kentucky received an "A "in the areas of use of technology and capacity to use technology in schools.

A recent review of the quantity and categories of information coming into and going out of the 175 school districts through their existing Internet data lines allows us to see exactly how much districts are using their networks on a regular basis. The results indicate:

- On average, 1.4 trillion bits per day of information from instructional Web sites across the world are coming into and leaving schools in districts across the state. This instructional use of the Internet currently takes up 76 percent of the network bandwidth.

- Another 11 percent of the network is used for instructional multimedia applications, and 4 percent is used for file transfers.

- On average, 6.4 million e-mail messages per day enter and leave schools in districts across the state. Collectively, these take up about 4 percent of the current network bandwidth.

- During the course of the entire day, the average administrative data traffic going from the school to the district, from the district to the school and from the district to the state takes up about 5 percent of the current network bandwidth.

As teachers increase their use technology as an integral part of instruction, they will become more comfortable and capable with the technology. Their use of technology-based online testing or instructional resources such as Encyclomedia will increase and become more effective.

In 120 school districts, students learn keyboarding skills by the 4th grade. While keyboarding is only one of the many technology skills students must have in school and life, it is an important indicator of the student's ability to use technology-based instruction. It is an indicator of how quickly a student can answer multiple-choice questions or compose answers to open response questions in a technology-based learning environment.

Kentucky is the first state in nation to have a standardized school and financial management system in every school and district. Automated state school data accumulators and unique student identifiers are in place. An educational enterprise database system has been made available to schools and other customers. At-home access for parents and students is available for viewing students' attendance, grades, discipline, and course progress.

Phase 1 Funding - KETS was fully funded. $620 million was spent to put all components of Phase 1 in place. The average annual funding during Phase 1 was $35 million per year.

Phase 2 Funding - In Phase 2 approximately $420 million was spent toward operations, maintenance and incremental replacement. However, this was $330 million less than was needed.

Existing Education Resources: A Foundation

- Most current Commonwealth Accountability Testing System (CATS) results, state Academic Expectations and the *Program of Studies*

- Research and studies from *Education Week's "*Technology Counts," the Milken Foundation, MGT of America, Gartner Inc., Kentucky Long Term Research Committee, Technology Use in Schools and the Auditor of Public Accounts

- Polices, including student, teacher and administrator technology skill standards and the KETS Acceptable Use Policy

- Measurement tools, such as the Scholastic Audit and the Technology Impact Review

- Plans, including the National Education Technology Plan, the Kentucky Board of Education Strategic Plan, previous KETS Master Plans, district comprehensive plans and individual growth and education plans

- Capacity-building services, such as technology resource teachers, the Student Technology Leadership Program (STLP) and the Information Technology Career Cluster

- Instructional software (content delivery, courseware, self-paced, e-books, research, reference), such as Internet 1, Evalutech, Marco Polo, KETS contracts (e-mail, IM, word processing, database, spreadsheets, presentation) and Kentucky electronic instructional materials

- Administrative software, including financial, student information system and the education warehouse

- Services for schools, such as KVHS, KVU, KVL, Active Directory, Internet content management, e-mail, scheduling, the unique student identifier, low-speed network, virus protection, small scale online testing, firewalls, voice communications in classrooms, Web site services, the KETS Service Desk (previously known as the Help Desk), and parent access to student information from home

Differences between This Plan and Previous Plans

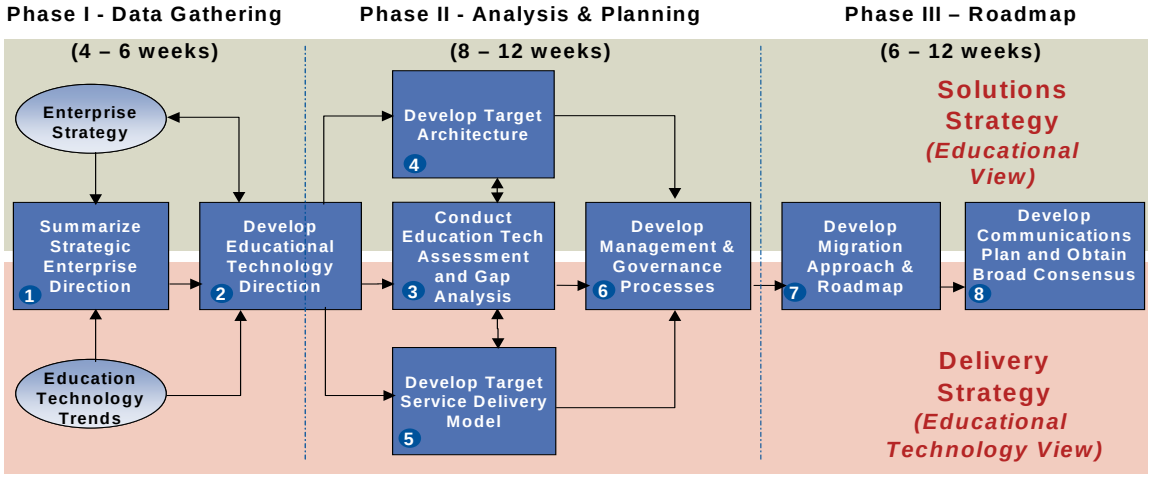
This is the third major technology Master Plan created by the Kentucky Department of Education. Each of the individual plans has had a focus and scope that varied, depending upon the overall situation that existed at the time. The 2007–2012 Master Plan differs from other plans in terms of the scope, process and content in the following ways:

- The **scope** of the 2007–2012 Master Plan is holistic because it includes the administrative and instructional computing needs of the state agency and the individual school districts. As a result, specific initiatives are included that address instructional computing needs that support the state agency's role in providing educational resources, as well as the district role in providing education to students.
- The **process** used to develop the 2007–2012 Master Plan was highly collaborative and inclusive. Individual interviews and focus groups were held with representatives from KDE, functional area representatives, external groups (vendors, former students, military and colleges and universities), and ten school districts. In addition, parents, guardians, students and teachers participated in an online survey.
- For **content**, this plan seeks to establish a tight linkage between technology applications and business and educational objectives, resulting in initiatives that cover technology management, specific technology implementations and core technology components.

Technology Strategy Development Methodology

The process used to define the 2007–2012 Master Plan is based on established technology strategy methodology. The framework was used to evaluate technology capabilities at the state agency and district level.

Technology Strategy Methodology



The technology strategy methodology consists of two conceptual sub-strategies: the Solutions Strategy, addressing what needs to be done, and the Delivery Strategy, addressing how it will be accomplished. We believe that many technology strategy approaches tend to focus on one or the other, but typically not both.

The development of the strategy starts with a solid understanding of Kentucky's P-12 education business strategy and relevant technology trends. KDE conducted interviews with state agency and school district personnel, and using their input, created a *Summary of the Strategic Education Business Direction*, including key, prioritized educational business initiatives. This allowed the team to develop an understanding of the current business and technology initiatives and their relevance to the business strategy.

The next major step was to **develop the high-level technology direction.** This included a clearly articulated set of technology imperatives expressly linked to the education business imperatives. In that way, we can be confident that the subsequently developed technology initiatives are clearly aligned to business needs. We developed an understanding of the key technology trends for higher education through our extensive research capabilities. The technology imperatives and alignment are typically developed through interviews and/or workshops.

The next step was to **conduct a technology assessment and gap analysis.** In this step, we developed an understanding of how well technology is able to meet current and future business requirements. We look holistically at the technology capabilities, including people, process and technology. We conducted a qualitative assessment of the existing architecture based on industry's best practices and our deep knowledge of technology. The output of this step included not only the assessment and gap analysis, but also the list of initiatives that should be undertaken in order to close the gaps. KDE

will apply a standard set of analyses to address the key technology capabilities relevant to the issues being addressed in this study. The technology assessment included the state agency and, to a limited extent, individual school districts, based on the information gained in assessing the capabilities of ten selected school districts.

Based on the business and technology imperatives and the stated technology direction, we recommended **target architecture requirements**, a statement of strategic direction and an approach for moving to the new environment. KDE will leverage its standard architecture frameworks, relevant research and experience with education technology providers.

With the same inputs, as well as the output of the gap analysis, KDE recommended initiatives to **optimize the service delivery model**. The service delivery model will include the technology organization framework, technology management processes, key technology services (e.g., Help Desk, security) and others. Our recommendations will be based on the specific initiatives underway and our research and experience in similar situations.

To successfully execute the initiatives, P-12 education must have effective **technology management and governance processes**. Beyond that, KDE believes that a strong overall technology governance structure is necessary for technology organizations to deliver as much value as possible to the business. We will use the same inputs and outputs from the gap analysis to identify the technology management and governance processes.

At the core of any solid technology strategy is a **migration approach and road map**. These elements bring the various recommendations into a cohesive plan for moving forward. The road map includes a timeline, project interdependencies, high-level budgets and resource estimates.

KDE worked with P-12 schools to **obtain broad consensus** for the outcomes of the technology strategy. While there are some specific tasks that typically occur as the last step in the strategic planning process, such as a formal communication, the consensus-building and communication process will start from the inception of the plan. KDE will work continuously with key stakeholders to keep them informed of progress, identify and resolve issues and build support for the overall program. This will include administrative management and other key stakeholders.

Finally, KDE will work with P-12 schools to develop an operational plan each year of this strategic planning effort. This will entail working with the KDE staff, KDE business owners and districts to prioritize activities each year, taking into account other budget priorities.

Other Analyses and Techniques

As a part of the planning effort, a variety of analytical tools are used to understand the education business-driven technology needs of the organization, align initiatives with education business direction or to assess specific areas. These included:

- **Individual interviews or workshops:** KDE conducted individual interviews or workshops to obtain qualitative information on business objectives, strengths and

weaknesses of technology applications, strengths and weaknesses of technology management practices and opportunities for improvement. Findings from these sessions were used to drive understanding of the business direction or input for the gap analysis.

- **Technology survey:** KDE conducted a survey of teachers, students, parents and guardians on their use of technology for instruction, learning and study.
- **KDE and district applications assessment:** KDE developed an inventory and high-level assessment of the enterprise applications used at the KDE and district level.

District Background Information

One objective of this project was to develop an in-depth understanding of individual school district education technology capabilities. To develop this understanding, KDE reviewed the District Technology Profiles and the District Improvement Plans.

District Technology Readiness and Activity Reports: The Office of Educational Technology has collected information on the technology capabilities of each of the school districts, which includes information on numbers of teacher, student and administrative workstations; age of the workstations; telecommunications capabilities at the school and district; information about the CIO and technology support staffs; and skill levels of students and teachers. This information was used as a baseline for the technology capabilities of the districts profiled. It also includes the funds spent for each of those items over the previous year.

The District Improvement Plan: Each district completes an improvement plan to capture information on the progress against educational goals for the school district and the specific actions needed to improve achievement against the goals. This information was used to gain insight on the individual districts prior to conducting workshops in the districts.

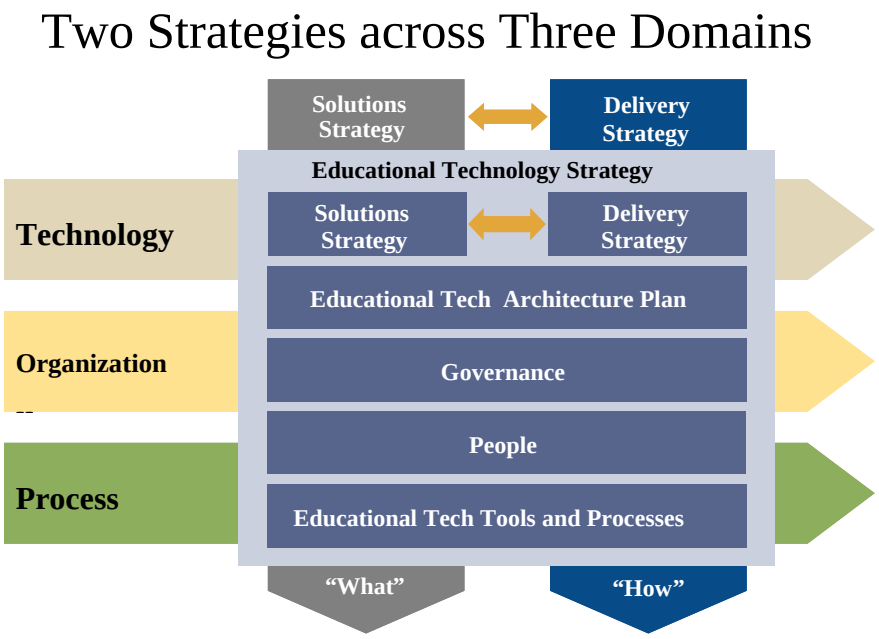
The individual districts as part of the focus group sessions, which entailed individual and group interviews, may have provided other information on the districts.

Kentucky Board of Education Strategic Plan Progress Report

The Kentucky Board of Education Strategic Plan Progress Report is produced biennially for the board by the Kentucky Department of Education. This report documents the progress against the goals for teaching and leadership quality and strong and supportive learning environments for in schools. The information contained in this report, specifically the goals and objectives, were used to demonstrate the alignment between those and the specific initiatives recommended as a part of this strategic planning effort.

The following shows the relationships between the technology, the organization and the process.

Educational Technology Assessment Framework



In obtaining input on education capabilities, KDE agency and school district participation in the planning effort provided insight on the desired technology management and provision from a customer perspective, technology-related decision-making and application of technology to support educational and administrative needs. Technology providers – state agencies, district personnel and OET representatives – provided insight on the preferred shared services model, technology-related decision making and the processes used for technology management and provisioning.

Accountability

This plan is comprised of clear initiatives that are intended to improve teaching, learning and efficiency. It also places new emphasis on accountability, holding schools, districts and the state responsible for improving student performance.

In addition to enhancing teaching and learning, technology offers support for activities commonly associated with school accountability and management, such as student assessment, teacher and program evaluation and data-based decision-making to support school improvement efforts.

An educational plan must contain a clear and updated needs assessment and a system for assessing the implementation of educational planning objectives. By providing specific initiatives that are linked to the overarching ideas discussed in the executive summary of this Master Plan, schools, districts and state agencies will be able to inquire about the progress of any one of the initiatives. Educational technology providers must justify the technology that they select, the projects that they undertake and their evaluation methods as well.

Each educational initiative needs to have how the level of success of the initiative will be measured. The initiatives will allow the educational leadership within the districts and KDE to demonstrate progress in their aim to enhance students' academic achievement and preparedness for higher education and the workforce. The initiatives will be resourced internally at the state and local level and externally. The plan has been created through school, district and state agency collaboration, and progress will be made using the same collaborative efforts. Educational technology is provided throughout the state using multiple groups who are working in tandem. As the detailed initiative planning begins, the exact resource requirements will be finalized and communicated to the educational technology providers.

Overview of the Planning Process

In addition to describing the perspective on developing an organizational technology strategy, this section will provide an overview of technology in the P-12 education environment and the unique challenges presented.

The fundamental concepts of equity, standards-based planning, unmet need and accountability, which are so vital to the original vision of the 1992 Master Plan for Education Technology, remain. They are as important today as they were fourteen years ago. They are proven and must be retained as guiding principles and benchmarks for all future decisions. We have incorporated, therefore, the concepts of the original Master Plan into this new Master Plan that will guide progress from 2007 and beyond.

The strategy used to develop the 2007–2012 Master Plan was based on established methods, with three major phases: data gathering, analysis and planning, and finally creating the roadmap.

Phase 1 - Data Gathering: The strategy starts with a solid understanding of Kentucky's P-12 education business strategy. To this end, KDE conducted interviews with state agency and school district personnel, and using their input, prioritized critical education business initiatives. The next major step was to develop a clearly articulated set of technology imperatives that are expressly linked to these education business imperatives. This alignment ensures technology serves education priorities.

Phase 2 - Analysis and Planning: The next step was to develop an understanding of how well present technology is able to meet current and future educational requirements. We defined these capabilities holistically to include people and process not just technology. The output of this step included not only the assessment and gap analysis, but also a list of initiatives that should be undertaken in order to close the gaps.

Phase 2 – Creating the Roadmap: At the core of any solid technology strategy is a migration approach and road map. These elements bring the various recommendations into a cohesive plan for moving forward. The road map will include a timeline, project interdependencies, high-level budgets and resource estimates. Based on the business and technology imperatives and the stated technology direction, we recommended:

- **Target architecture requirements** - a statement of strategic direction and an approach for moving to the new environment.

- **Optimize the service delivery model -** initiatives will include the technology organization framework, technology management processes, key technology services (e.g., Help Desk, security) and others.

- **Technology management and governance -** To successfully execute these initiatives and maximize value to the education business, P-12 must have an effective management processes and governance structure. We will use the same inputs and outputs from the gap analysis to identify the technology management and governance processes.

The road map reflects two strategic views: *Educational*, addressing what needs to be done (Solutions Strategy) and the *Technological*, addressing how it will be accomplished (Delivery Strategy). We believe that many technology strategy approaches tend to focus on one or the other, but typically not both.

Implementation - While there are some specific tasks that typically occur as the last step in the strategic planning process, such as a formal communication, the consensus-building and communication process will start from the inception of the plan. KDE will work continually with key stakeholders and P-12 schools to keep them informed of progress, identify and resolve issues and build broad support for the program.

Finally, KDE will work with P-12 schools to develop a yearly operational plan. This will entail working with the KDE staff, KDE business owners and districts to prioritize activities each year, taking into account budget priorities.

From an overall district planning perspective, districts should describe their key educational goals, objectives and initiatives in a district education plan. Companies call this their business plan; districts mainly call this their Comprehensive Plan. Some of those educational initiatives in the district plan may rely on the use of technology tools. For example, a district wanting to improve social studies scores may identify a strategy that requires an electronic projector coupled with student “clickers” in some classrooms. This technology will allow the social studies teachers to better use the Encyclomedia product for classroom instruction for components of the program of studies. Additionally, the technology can be used for formative testing to give the teacher instant feedback on concepts mastered and teaching points that need to be covered again.

The district education/business plan usually identifies the specific funding source for each person, product or service needed to achieve the educational objectives. From a KETS perspective, the district first lays out their needs regardless of funding source, then identifies the funding source(s) to be used to address the need.

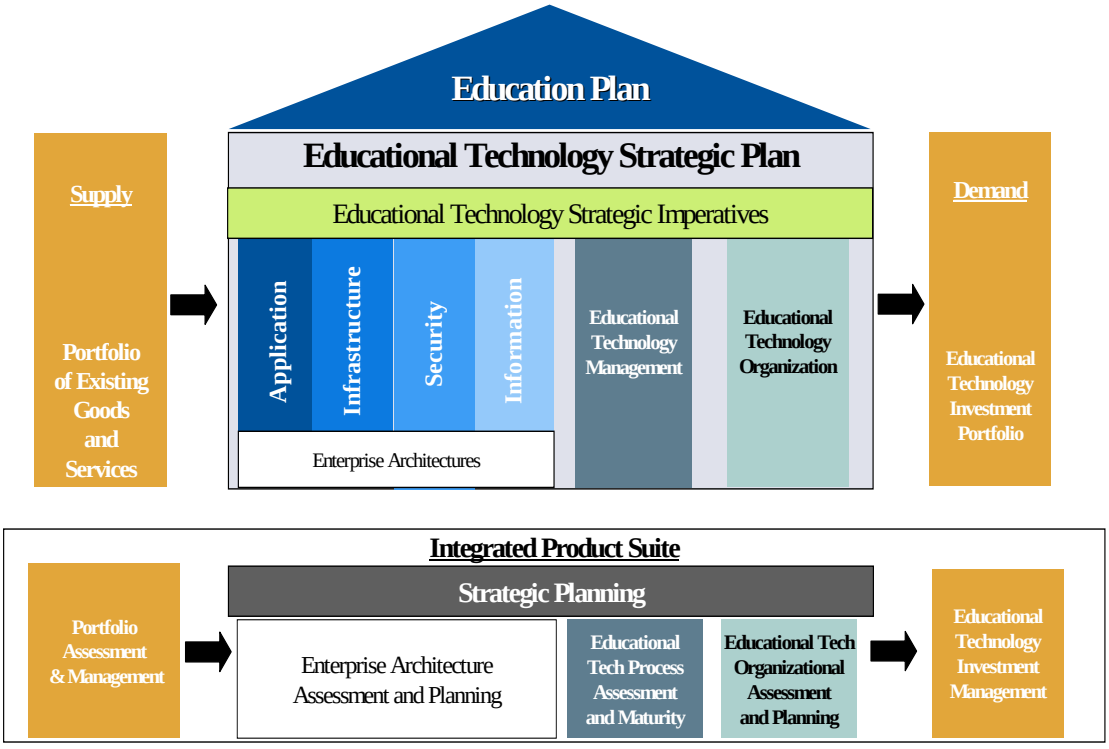
Technology Framework

The overall framework for technology assessment and strategic planning is shown below. The framework addresses both the supply and demand sides of managing technology resources using a business-focused approach:

- The education business plan is the foundation, and it shapes the overall structure of the technology strategic plan.
- This master plan describes the technology strategic imperatives or those things that technology must do in order to enable the business of education.

- The enterprise architecture is the vehicle through which many of the technology products and services are delivered, when combined with the available supply of technology goods and services.
- Technology management activities are the management processes used to shore up this entire foundation — they are used by the technology organization to provide the governance, skills and structure needed to enable the organization to deliver technology services effectively.
- Technology demand refers to the requests from the organization for technology services, and technology supply refers to the people, technology and financial resources available to satisfy that demand.
- The approach to strategic technology planning crosses all these areas.

Framework for Technology Assessment and Strategic Planning

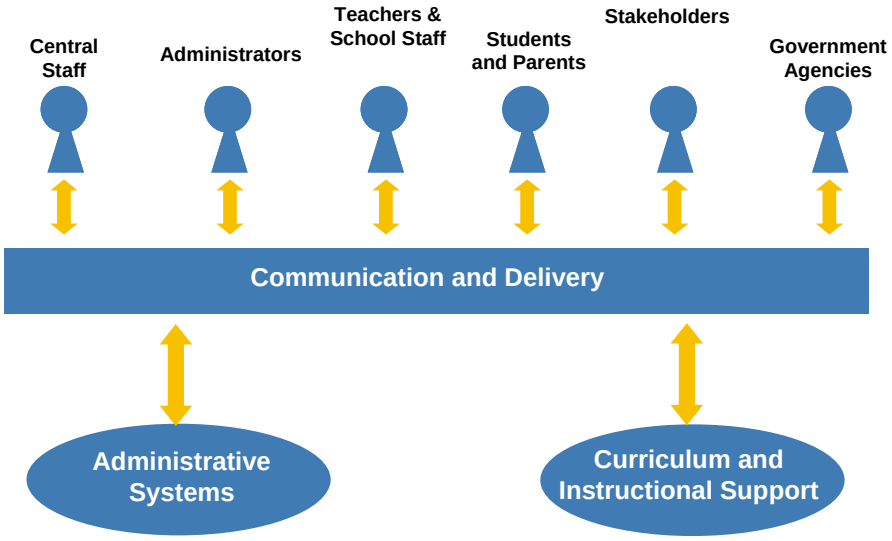


KETS Perspective on Education Technology

KETS uses the P-12 Technology Framework to describe a best practice approach to understanding and deploying technology to support the P-12 environment. Within this framework, departments of technology focus on three areas – administrative systems, curriculum and instructional support systems and communications and delivery capabilities.

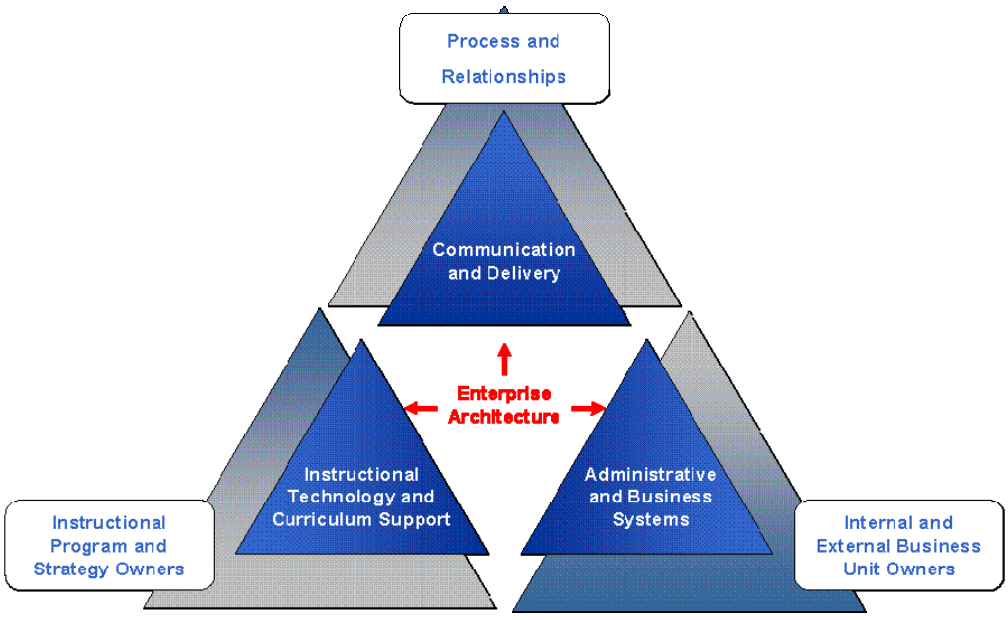
- The administrative systems are the business and administrative functions, such as the student information systems and integrated financial and human resources systems.
- Communication and delivery capabilities focus on the infrastructure elements that enable the technology — telephony and video, maintenance, Help Desk, local and wide area networks, desktop solutions and more.
- Curriculum and instructional support are at the core of the mission of the school district – they support instruction and curriculum areas and include technologies that support shared academic standards, curriculum alignment, lesson plans, grade books, test creation and history.

Within this broad framework, the technology organization is responding to the needs of a variety of stakeholders, including central staff, administrators, teachers and school staff, students and parents, federal and state government agencies and other public stakeholders. These interactions are shown in the following figure.



KETS P-12 Technology Organization Interactions

The following figure illustrates the relationship of the technology organization to the educational enterprise as a whole. It shows how these three technology operations: administrative systems, curriculum support and delivery capabilities are tied together through the enterprise architecture.



Relationship between Technology Function and the Education Enterprise

Note how the instructional and administration operations are positioned to work within the larger context of their corresponding “owners”. Instructional technology is driven by instructional strategies and administration systems must meet the needs of the school district education business.

The enterprise architecture is the middle area that uses soft people skills to join the business of education to the technology agenda.

In its simplest form, the enterprise architecture provides the “rules for the road” for connecting the disparate areas of effort, both now and in the future, by:

- Gathering school/district "education business" strategy and drivers
- Recognizing and understanding environmental trends
- Developing a common requirements vision — a document that says, “Here is where we (the whole enterprise) need to go.”

The Enterprise architecture is entrepreneurial in that it reflects the current and growing needs of the organization. However, placed in the middle, education technology both in school districts and at KDE is faced with the challenge of providing the infrastructure that balances administrative needs with instructional and educational computing needs. Education technology must leverage limited resources to achieve the widely varying educational and administrative goals.

A Summary of Research and Study Results of Basic Skills Required By Students for K-12, Higher Education, the Workforce and Life

A national report entitled “The Digital Disconnect: The Widening Gap Between Internet-savvy Students and Their School” evaluated the school Internet use in instruction through the eyes of students. Students stated they are becoming frustrated that the principals and teachers in the school system have not yet modernized their teaching approach fast enough to sufficiently take full advantage of electronic educational resources in the classroom. This included access and use of Internet web sites and electronic communication tools. The study stated “Educators have a choice: Either quickly adapt, or they will be dragged into a new learning environment.”

Key findings from the study (http://www.pewinternet.org/reports/index.asp) include the following: Internet-savvy students rely on the Internet to help them do their schoolwork—and for good reason. Students told us they complete their schoolwork more quickly; they are less likely to get stymied by material they don’t understand; their papers and projects are more likely to draw upon up-to-date sources and state-of-the-art knowledge; and, they are better at juggling their school assignments and extracurricular activities when they use the Internet. In essence, they told us that the Internet helps them navigate their way through school and spend more time learning in depth about what is most important to them personally.

“Internet-savvy students describe dozens of different education-related uses of the Internet. Virtually all use the Internet to do research to help them write papers or complete class work or homework assignments. Most students also correspond with other online classmates about school projects and upcoming tests and quizzes. Most

share tips about favorite Web sites and pass along information about homework shortcuts and sites that are especially rich in content that fit their assignments. They also frequent Web sites pointed out to them by teachers—some of which had even been set up specifically for a particular school or class. They communicate with online teachers or tutors. They participate in online study groups. They even take online classes and develop Web sites or online educational experiences for use by others.

The way students think about the Internet in relation to their schooling is closely tied to the daily tasks and activities that make up their young lives. In that regard, students employ five different metaphors to explain how they use the Internet for school:

1. The Internet as a virtual textbook and reference library. Much like a school-issued textbook or a traditional library, students think of the Internet as the place to find primary and secondary source material for their reports, presentations, and projects. This is perhaps the most commonly used metaphor of the Internet for school—held by both students and many of their teachers alike.
2. The Internet as a virtual tutor and study shortcut. Students think of the Internet as one way to receive instruction about material that interests them or about which they are confused. Others view the Internet as a way to complete their schoolwork as quickly and painlessly as possible, with minimal effort and minimal engagement. For some, this includes viewing the Internet as a mechanism to plagiarize material or otherwise cheat.
3. The Internet as a virtual study group. Students think of the Internet as an important way to collaborate on project work with classmates, study for tests and quizzes, and trade class notes and observations.
4. The Internet as a virtual guidance counselor. Students look to the Internet for guidance about life decisions as they relate to school, careers, and postsecondary education.
5. The Internet as a virtual locker, backpack, and notebook. Students think of the Internet as a place to store their important school-related materials and as a way to transport their books and papers from place to place. Online tools allow them to keep track of their class schedule, syllabi, assignments, notes, and papers.

Many schools and teachers have not yet recognized—much less responded to—the new ways students communicate and access information over the Internet. Students report that there is a substantial disconnect between how they use the Internet for school and how they use the Internet during the school day under teacher direction. In light of the fact that the Internet is increasingly integrated into the home and school lives of students, and in the context of larger arguments about the use of the Internet for school, students' concerns can spark several policy debates about technology and education. This is what we heard from students:

- Students want better coordination of their out-of-school educational use of the Internet with classroom activities. They argue that this could be the key to leveraging the power of the Internet for learning.

- Students urge schools to increase significantly the quality of access to the Internet in schools.

- Students believe that professional development and technical assistance for teachers are crucial for effective integration of the Internet into curricula.

- Students maintain that schools should place priority on developing programs to teach keyboarding, computer, and Internet literacy skills.

- Students urge that there should be continued effort to ensure that high-quality online information to complete school assignments be freely available, easily accessible, and age-appropriate–without undue limitation on students' freedoms.

- Students insist that policy makers take the "digital divide" seriously and that they begin to understand the more subtle inequities among teenagers that manifest themselves in differences in the quality of student Internet access and use.

Of course, student use of the Internet for school does not occur in a vacuum. Students' experiences, and those of their districts, schools, teachers, and parents, strongly affect how the Internet is adopted in schools. Nonetheless, large numbers of students say they are changing because of their out-of-school use of the Internet—and their reliance on it. Internet-savvy students are coming to school with different expectations, different skills, and access to different resources.

They cannot conceive of doing schoolwork without Internet access, and yet they are not being given enough opportunities in school to take full advantage of the Internet. Many believe they may have to raise their voices to force schools to change to accommodate them better.

Educators should not shy away from electronic learning tools (e.g., email, web sites) for fear of the risks associated with it given the positive payoffs to the students educational experience in the school is so high when they are given access and use them. Schools need to embrace modern tools and spend their energy using and maximizing all possible electronic learning tools that their student customers are requesting be part of their instructional toolbox." Current research has close to 70% of the teachers indicating using computers and the Internet during the week for lesson planning/research, information searches, and classroom presentations/demonstrations.

The three most important variables in predicting teachers use in the classroom is:
- High speed classroom access to computers and the Internet (a financial issue)
- Technology skill level of the teacher (a PD issue)
- Teacher's pedagogical beliefs and practices (high school science/English teachers are currently more likely to use computers and the Internet than middle school math teachers or high school art teachers)

There will be increased pressure from students of all ages and parents for all three of these areas to be addressed.

The National Department of Education National Center for Education Statistics study that was released in Sept of 2006 succinctly describes the differences between public and private schools in regards to the school and home use of computers and the Internet. Public school classrooms are more likely to have access to and use computers and the Internet for instruction. Private school students are more likely to have access to and use computers and the Internet for instructional purposes in their home. This reflects the growing demographic and socioeconomic divide in our country. The study shows the public schools play a key role in helping overcome that divide.

While public schools had a big jump on the private schools in the areas of computers and Internet use in the classroom, the private schools have significantly been closing that gap. Private schools have made adjustments to their tuition costs to incorporate computers and the Internet. Also, much like higher education, we believe you will see more acceptance in K-12 in allowing personally owned devices by teachers and students to brought into and used in the school classrooms. This will allow schools to close the gap in regards to "ease of access" to computers and the Internet across all parts of the curriculum at both the home and school. This highlights out the critical need to fund these tools for public school students from homes that have low parental income and levels parental education.

According to the Kentucky Long-Term Policy Research Center's study" Kentucky High School Students and Their Future Education Plans":

"Kentucky's investment in education technology in public schools, which has been a component of education reform from its inception, seems to be reaping rewards as far as students' facility with software is concerned. Of course, given the rate at which computers have spread to homes across Kentucky and the rest of America, many students would be learning these skills even if schools had nothing more than antiquated typewriting equipment. Yet these survey results suggest students are learning many key skills in schools, and that schools can help close the digital divide that may exist between homes that can afford computer equipment and Internet services and those that cannot. It is perhaps an irony, of course, that students with first-rate technology skills might accept well-paying technology job offers even before they graduate from high school and therefore choose not to enroll in a postsecondary program. Kentucky has also seen expansion of services, transportation, and technology-driven industries. It appears that the state's investment in technology has paid dividends. Students learn how to use computers in school, and that has important implications for closing what has been dubbed the digital divide.

On at least one education reform initiative, students appear to be faring well when compared to other states: they view their computing skills, specifically, as being very good and say they learned some of them in school. It is logical to assume that the emphasis on technology in education reform has been translated into useful computing skills. Such success suggests that access to technology should be expanded in Kentucky's public schools so that more students can gain software skills.
Most students have access to a computer, know how to use it, and, perhaps reflecting the success of the state's efforts to boost computer literacy, learned basic skills such as word processing and spreadsheets in school.

Despite the fact that a substantial number of students have access to computers in their homes, the effects of computers in schools are clearly evident in their survey responses. Indeed, the overwhelming majority of students learned about word processing and using spreadsheets in school. In addition, over one third of the students report acquiring skills in using the Internet in their schools. Using e-mail is the one skill area where experiences in the home quite clearly dominate those of the school.
Not only have students acquired computing skills, they also appear capable of using them. With the exception of being able to analyze data using a spreadsheet, which less than half of the students say they can do without assistance, the remaining skills—using a word processor, the Internet and e-mail—appear to be solidly established among these students.

Thus, schools may be “evening the playing field” in areas such as computing. By giving every student access and providing them with the requisite skills, schools can compensate for lack of computing opportunities in the home. These survey data permit examination of the extent to which parents’ income and educational levels were related to having a computer and Internet connection at home. As one might expect, there are big differences associated with students’ backgrounds. Almost all children of parents in the highest income group report having a personal computer at home while less than 60 percent of children from the lowest income groups say they do. The comparable numbers for an Internet connection are 93 percent and 45 percent. Similar differences are found for levels of parents’ education. Ninety-six percent of students whose mother’s educational level is college or above report a computer at home compared with 58 percent for students of parents with the lowest educational level. Results are almost identical when comparing students with fathers from the highest education level with students whose fathers are at the lowest levels.

The differences among these groups are substantially smaller when one looks at students’ reports of how capable they consider themselves to be with computers and software. For example, students of highest parental income and lowest parental income levels report differences of only about 7 percentage points in terms of using the Internet without assistance, 13 in terms of using word processing, and about 10 when using a spreadsheet. The results are similar for both mothers’ and fathers’ education levels. For spreadsheets, the differences are 7 and 12 percentage points; for word processing, 9 and 11 percentage points; and for using the Internet, 14 and 13 percentage points. The biggest differences among the groups have to do with e-mail where, for each of the background characteristics, the differences are about 25 percentage points.

The pattern of differences between the use of word processors and spreadsheets in schools vis-à-vis the use of the Internet and e-mail may reflect a reluctance on the part of schools to confront the problems of computer “literacy.” That is, unfettered access to the Internet by students with basic computing skills—which could conceivably improve their Internet and e-mail capabilities—might also provide potentially embarrassing situations for school personnel because some students might visit inappropriate websites. Hence, school officials are presumably engaging in a balancing act, attempting to foster computer skills without exposing students to unsuitable material that is freely available over the Internet. At present, this approach seems to promote word processing and spreadsheet skills while limiting other high-technology skills somewhat.

These data suggest, in short, that the smaller gaps between students’ reports of their technology capabilities and the presence of a computer in their home are due largely to schooling. Although students of different backgrounds do not consider themselves equally capable, the differences are much smaller than they would likely be if the students did not have those experiences in schools. These seem to be among the effects of schools and of the emphasis within education on expanding technology available to schools.”

Student Computing: Access, Where Learned, and How Well		
Students Having Access to a Computer	Number	Percent
Personal computer at home	887	87
Internet at home	774	76

Student Computing: Access, Where Learned, and How Well		
Where did you acquire the following computer skills?	Mostly Outside of School	Mostly in School
Use a spreadsheet to analyze data	22%	65%
Format documents using a word processor	38	60
Use the Internet to find information for a specific project	64	34
Use e-mail to communicate or to send and receive attachments	77	13
How capable are you of performing the following computer skills?	Without Help	With a Lot of Help
Use a spreadsheet to analyze data	39%	9%
Format documents using a word processor	84	2
Use the Internet to find information for a specific project	86	2
Use e-mail to communicate or to send and receive attachments	75	5

Higher education, which is also in the business of educating students, has successfully made the transition in providing ease of access and use of the Internet and e-mail as part of their student's learning experience. Their students are older than K-12, but the value that the Internet and e-mail can add to the learning process is very similar. Therefore, it is valuable to examine another organization that is also in the business of educating students that has already recognized the importance of easy access of electronic learning tools for teachers and students. The use of the Internet and e-mail in post secondary schools gives K-12 a window to view the near future expectations and needs of their students. KDE had conversations with representatives of eight public Kentucky colleges and determined that (1) the Internet and email significantly enhance the learning experience of students, (2) it took time for the teachers to become comfortable using the Internet and email as part of their instructional tool box after they were purchased, installed and turned on, (3) students became frustrated, and then very vocal when the Internet and email was not being used as an instructional tool by their teachers and this helped speed the change in their teacher's attitude toward the Internet and email, (4) once teachers and students had easy and frequent access to the Internet and e-mail as part of instruction there would be no way of going backward and turning these valuable resources off now and (5) higher education expects students to have mastered the skills associated with the appropriate use of email when they arrive on campus.

Community and technical colleges also expect these skills of incoming students. All students in each these universities had access to the Internet and a student e-mail

account from the various student workstations on campus or from their dorm rooms. Most higher education institutions no longer offer courses on email use for their incoming students. Therefore, e-mail is becoming a pre-requisite skill for entering postsecondary students. A national study titled "The Internet Goes to College: How students are living in the future with today's technology" (http://www.pewinternet.org/reports/index.asp) was released that said "Internet use is a staple of college students' educational experience. They use the Internet to communicate with professors and classmates, to do research, and to access library materials. For most college students the Internet is a functional tool, one that has greatly changed the way they interact with others and with information as they go about their studies.

- Nearly four-fifths of college students (79%) agree that Internet use has had a positive impact on their college academic experience.
- Almost half (46%) of college students agree that email enables them to express ideas to a professor that they would not have expressed in class, but, some interactions are still primarily face-to-face: Only 19% of students said they communicate more with their professors via email than they do face-to-face. Sixty five percent of the Western Kentucky University students surveyed indicated e-mail would be a satisfactory way to communicate with teachers if they could not get with them face to face before, during or after class.
- Nearly three-quarters (73%) of college students say they use the Internet more than the library, while only 9% said they use the library more than the Internet for information searching. In a separate study done a few years ago, 60% of the students felt electronic information was more reliable than what they found in books.
- About half of all college students (48%) are required to use the Internet to contact other students in at least some of their classes.
- Two-thirds (68%) of college students reported subscribing to one or more academic-oriented mailing lists that relate to their studies. They use these lists to carry on email discussions about topics covered in their classes.
- More than half (58%) of college students have used email to discuss or find out a grade from an instructor.
- College students are frequently looking for email, with 72% checking email at least once a day."

The work environment also has an expectation that new employees will know not only the technology skills of the Internet and email but also the techniques in how to use it before they will consider them as a potential candidate for hire. A recent survey of companies revealed that Internet and electronic communication literacy skills is one of the core skills that corporations believe students should have as part of their K-12 education.

In the digital age, schools must begin to plan how they will provide access to administrative, teaching and learning resources (e.g., workstations, school instructional servers, school administrative servers, e-mail, the Internet, virtual learning courses) 24 hours a day, seven days a week from school and non-school locations. Ease of access to a wide range of school electronic tools during and after school hours from school and non-school locations becomes even more crucial to students that do not have a personal computer and the Internet in their home.

Appendix B:

Current Technology Assessment

Summary of Findings

A review of the current educational technology situation in Kentucky's K-12 educational environment yields the observations and recommendations contained in the next several tables and charts.

The Plan builds on Education Resources Already in Place

- **Assessments** Most current Commonwealth Accountability Testing System (CATS) results, state Academic Expectations and the *Program of Studies*
- **Research and studies** from *Education Week's* "Technology Counts," the Milken Foundation, MGT, Gartner Review, Kentucky Long Term Research Committee, Technology Use in Schools and APA
- **Polices**, including student, teacher and administrator technology skill standards and the KETS Acceptable Use Policy
- **Measurement tools**, such as the Scholastic Audit and the Technology Impact Review
- **Plans**, including the National Education Technology Plan, the Kentucky Board of Education Strategic Plan, previous KETS Master Plans, district comprehensive plans and individual growth and education plans
- **Capacity-building services**, such as technology resource teachers, the Student Technology Leadership Program (STLP) and the Information Technology Career Cluster
- **Instructional software** (content delivery, courseware, self-paced, e-books, research, reference), such as Internet 1, Evalutech, Marco Polo, KETS contracts (e-mail, IM, word processing, database, spreadsheets, presentation) and Kentucky electronic instructional materials
- **Administrative software**, including financial, SIS and Education Warehouse
- **Services for schools**, such as KVHS, KVU, KVL, Active Directory, Internet content management, e-mail, scheduling, the unique student identifier, low-speed network, virus protection, small scale online testing, firewalls, voice communications in classrooms, Web site services, the KETS Service Desk (previously known as the Help Desk), and parent access to student information from home

Unified Management

- There must be a unified approach and understanding of how the individual components fit to form this framework and its support of the strategic direction.
- Individual districts must perceive technology to be helpful, depending on characteristics of their specific locations.
- Isolated funding decisions and suboptimal use of resources should be limited.
- The lack of a unified approach opens the door for multiple agendas, executed by multiple education technology providers. Those further fragment efforts and management.

Independent Observations and Recommendations

KETS Has Been Implementing Cost-Saving Best Practices

Ed Tech Efficiency Best Practices	What KETS Has Accomplished
Developing a centralized model for computing infrastructure ❑ Agency units no longer own or operate major portions of their infrastructure. ❑ Large-scale computing (mainframes enterprise servers) are consolidated at the enterprise level (or outsourced) under the CIO or central data center.	**Consolidated servers through active directory and exchange migration** ❑ Standardizes the state on single-server operating system and consolidates server computing infrastructure platform ❑ Consolidated 4,400 servers to under 400 servers used for active directory, e-mail and Web servers ❑ No state has accomplished this, and savings are in the millions in the long run.
Consolidating network infrastructure and management ❑ Done through consolidation of physical networks or contracts with bandwidth suppliers ❑ Capacity is used more efficiently, and fewer resources are required to support the network.	**Implemented centralized active directory services** ❑ Active directory allows enterprises to organize their networks into a single, centrally-managed structure and automates many network management tasks. Goal is to improve security, reduce recurring costs and complexity, stabilize backbone services and lay foundation for better collaboration over the network.
Creating a standard enterprise architecture ❑ Develop and enforce education technology standards ❑ Reduce the complexity and expense running the infrastructure and ensure the enterprise interoperability of applications	**Developed IT standards, enforced by statute** ❑ Education technology standards for available for desktops, servers, printers network equipment and wiring. ❑ KRS 156.160(1) stipulates that the Kentucky Board of Education has a statutory mandate to prescribe IT standards, which school districts shall meet.

KETS Has Been Implementing Cost-Saving Best Practices

EdTech Efficiency Best Practices

- **Desktop Computing**
  - Short term savings for desktop computing is largely limited to postponing purchases.
  - Long term savings from desktop costs can be significant, and all enterprises should empower the CIOs to set desktop standards for hardware, software, training and the Help Desk.
  - The enterprise should commit to no more than two or three desktop platforms (one is ideal), one standard for laptops and one office software suite.
  - The financial advantages include:

    - Economies of scale on procurement: Larger volumes enable great price discounts.

    - Training: With fewer platforms, there are fewer products on which to be trained. More importantly, as people transfer from one part of the organization to another, there is no loss in productivity due to lack of training.

    - Help Desk support: Fewer products to support will reduce the complexity of the Help Desk environment. It also enables an enterprise Help Desk consolidation that will provide consistent, universal services to all agencies in the organization.

What KETS Has Accomplished

Standard for Procurement of Statewide Education Desktop Computing

- Master contract defined the standards for procuring new computers.
- Savings are potentially high.

Cost efficiency currently is greatly reduced by having no minimum standards for already-deployed desktops and other infrastructure components.

- Minimum standards stipulate the minimum configuration of desktops deployed.
- With no minimum standards, older, outdated desktop hardware and software are allowed to proliferate.
- Kentucky has very many versions of platforms (Win 3.1, Win 95, 98, Win NT, Win 2000, MacOs). As a result, Kentucky is ranked very low in the US in terms of the quality of its desktop computing infrastructure.
- This has occurred due to a lack of technology refreshment and deferred purchases that save on the short term, but are inefficient in the long term.

KETS Has Been Implementing Cost-Saving Best Practices

Ed Tech Efficiency Best Practices

- **Standardize & centralize enterprise applications**
  - Common systems for e-mail, financial management and information management save a great deal of money compared to fragmented approaches.
  - The lack of an enterprise strategy for these types of applications often results in costs that spiral upward.
  - Centralizing applications can save significant resources in the long term, but not the short term.
- **Implement the use of master ed tech contracts**
  - Organizations reap considerable savings by consolidating contracts for hardware, software and services.
  - Fewer, larger contracts may generate better pricing and economies of scale.
  - There are many advantages to creating a master contract with pre-qualified vendors able to provide services on demand. These contracts ensure that work gets done in a time-sensitive manner without the need for time-consuming, costly procurement processes.

What KETS Has Accomplished

- **Standardized and centralized major KDE and district applications**
  - No other state has successfully standardized statewide applications for education to the extent of Kentucky's. Examples include the statewide student information, financial management and network and e-mail systems.
  - KDE is saving millions through this strategy.
- **KETS has created master vendor contracts that districts and KDE use for education technology procurement.**
  - Contracts exist for the following education technology components:
    - desktops, laptops and printers
    - file servers
    - networking equipment
    - Microsoft Office and virus protection software
  - KDE is saving millions through this strategy.

Observations: Total Cost by Technical Area

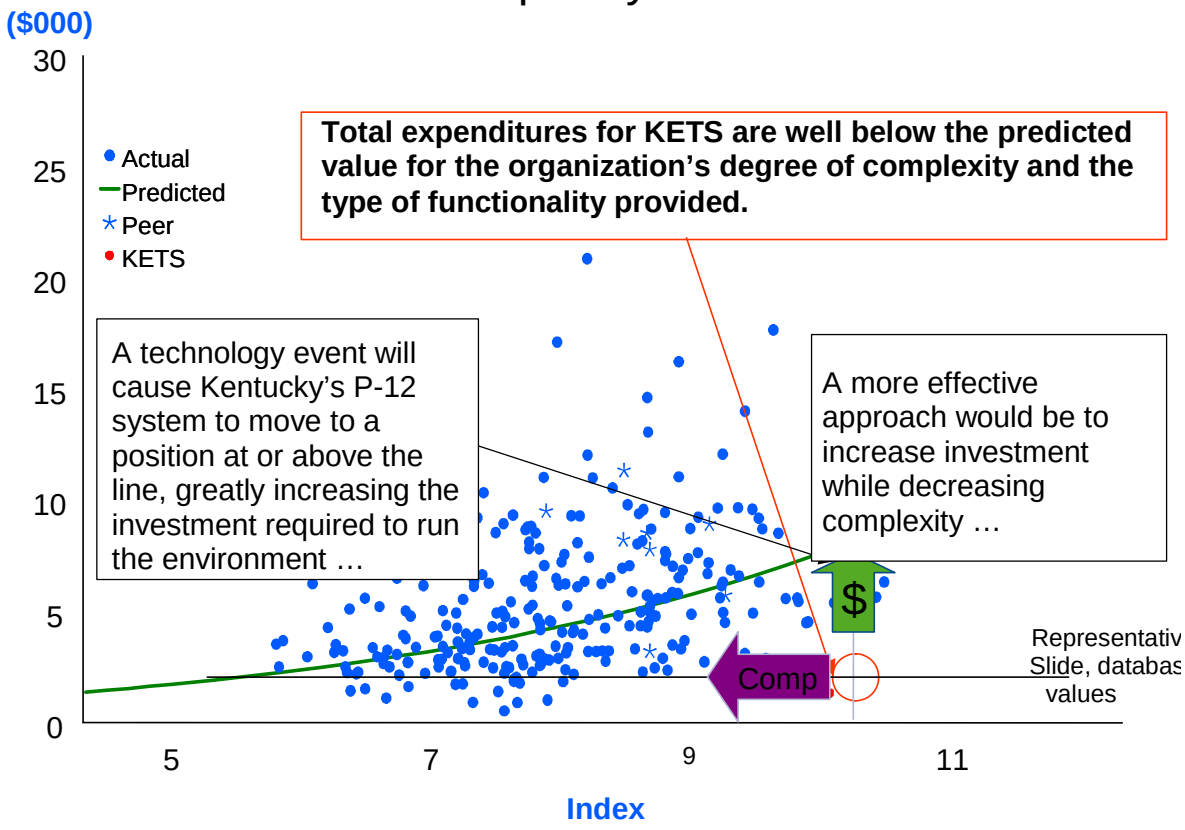
- **KETS continues to operate at a higher efficiency level than peer organizations in most education technology service areas.**
  - The aggregate consensus model cost for KETS for those areas included in the study (at $95 million versus $426 million) are $331 million lower – 78 percent – than what the composite peer group would spend to perform KETS' services.
  - For the services measured, at the summary level, KETS outperforms the efficiency of selected composite groups in the following areas:

- Midrange NT	72%
- Midrange Unix	85%
- Distributed	79%*
- Applications Development	35%
- Applications Support	40%
- Wide Area Network	75%
- IT Help	10%

* normalized to devices, not users

Summary of Findings

Total Education Technology Expenditure per Complexity



Enterprise-Wide Priorities and Requirements

P-12 Education Business Model Framework

A view of the P-12 education business model was developed that drives how technology should be managed and deployed to meet the needs of the organization as it carries out its mission. The core components of the education business model are listed below.

- **Universal, Equitable Access to Education Resources**
  - widespread, highly-distributed access to content, information, communication tools, advice and data supporting instructional, administrative, assessment and accountability processes
  - access and resources directly tied to roles and responsibilities
- **Enterprise Processes**
  - leadership and guidance around district- and school-level processes for instructional, administrative, assessment and accountability processes
  - local management and accountability of district-specific operations, such as cafeteria and school nutrition programs, transportation, facilities management and transportation
  - local processes for state organization-specific processes, such as policy setting and budgeting
  - ability to aggregate, disaggregate, analyze and report on data collected about student, school, district and statewide instruction activity and achievement
- **Technology Infrastructure**
  - computing and communications infrastructure to enable local, district and state organization operations and performance management using technology

P-12 Education Strategic Business Drivers

KDE conducted interviews with the administrative and educational leaders in the agency and districts to identify the education business approaches to meeting the demands that external factors will place on P-12 over the planning horizon and that are critical to meeting the mission of educating Kentucky's children.

The business drivers are categorized into the following areas:

- **Mission-Oriented Drivers:** This category reflects drivers that directly impact the district and KDE's mission as an oversight organization for P-12 education for the Commonwealth of Kentucky. Mission-oriented drivers are separated into the following categories:
  - instructional – pertains to priorities on instructional activities, including diagnostic and formative assessment activities, curriculum development and instruction
  - professional development – pertains to priorities for instructional personnel and includes professional development and technology resource teachers
  - assessment and accountability – pertains to data collection, reporting and dissemination of information demonstrating educational achievement

- **Business Process Change Drivers:** How committed are districts and KDE to the established way of doing business? A desire to abandon current processes usually implies significant structural business process change, often driven by a business model change. If the focus is strictly on deciding what projects to do next, strategic thinking is rarely forthcoming.
- **Partnership/Collaboration Drivers:** Are districts and KDE thinking strictly in terms of doing things internally on their own or is there a push to integrate more with customers or providers? The degree to which districts and KDE want to engage their stakeholders says a great deal about the form that business processes will take, and therefore, what kind of technology infrastructure will be needed to serve them. By focusing on stakeholders, we also include instructional personnel and other school-based employees, administrators, parents, funders, state staff and other key groups.
- **Funding Drivers:** Funding is the biggest factor. The level of funding on the table goes a long way toward determining the true bounds of technology strategies.

Mission-Oriented Drivers

Mission-oriented business drivers can be further categorized into those that address the instructional mission, the professional development mission or the assessment and accountability mission. KDE and district leadership believe that technology, when integrated into the instructional and professional development processes, can lead to greater return on the investment in technology and is critical to achieving educational goals in schools. In addition, given the vast amounts of information involved, technology is critical to assessment and accountability activities. This belief is reflected in the following mission-oriented drivers.

Instructional

This driver facilitates technology-integrated instructional efforts for a diverse student population by creating a shared appreciation for the impact of technology; providing consistent and equitable maintenance, training and support; and maintaining infrastructure to achieve manageable service levels.

- Establish educational standards that reflect usage of technology as a basic tool (i.e., such as a pencil) and other proficiency standards and that make instruction student-friendly.
- Ensure that instructional professionals are able to use technology for individual and collective differentiated instruction, monitoring progress and documenting education achievement
- Ensure that special needs students and their instructional personnel have assistive technologies to enable special learning situations.
- Deploy technology to meet district and state learning and achievement objectives.
- Assist instructional personnel in overcoming reluctance with respect to technology.
- Ensure that the broad and diverse student population is able to use technology independently for study, research and learning.
- Maintain the technology infrastructure at an operating level that encourages usage by students and instructional and administrative personnel
- Shift from a paper-based approach to electronic, collaborative, online approaches for assessment, diagnostics and instruction to improve productivity and ability to focus on individual progress and learning.

- Provide opportunities to increase parental access and involvement and student engagement in the instructional efforts.

Professional Development

This driver enables instructional personnel to leverage technology to support their instructional, diagnostic/assessment and administrative needs and to simplify business processes.

- Facilitate convenient access to a range of technology-related professional development solutions, including individualized, just-in-time support; self service training; and periodic classroom style instruction that evolves as the integrated instruction capabilities mature and expand.
- Provide for increased collaboration among instructional personnel within the state and with external communities.
- Provide online learning communities and independent development options.
- Identify technology support personnel with combined instructional and technology expertise to facilitate learning and sharing of best practices.
- Overcome fears and reluctance of instructional personnel with respect to technology.
- Deploy administrative and instructional solutions, such as e-forms and student administration, to improve instructional productivity
- Enable teachers to shed the unnecessary tasks and processes resulting from disparate systems and redundant data entry and handling.
- Streamline the ability to conduce diagnostic and other assessment activities.
- Provide consistent leadership around instructional technology initiatives through all levels of the organization to improve overall return on investment in technology.
- Improve the technical proficiency of administrators to promote an environment of technological openness and importance.
- Frequently research and evaluate new tools for instruction and professional development.

Assessment and Accountability

This driver improves access and availability of accurate, standardized, statewide data in order to meet external reporting and regulatory requirements, provide insight into educational achievement and improve decision-making capabilities.
Provide administrative information, instructional resources and assessment data.

- Ensure data aggregation, analysis and trending.
- Provide administrators with holistic student data for improved decision-making regarding student academic performance.
- Generate more insightful analysis, whether for state reporting or for local school purposes.
- Enable more frequent and periodic assessment of student progress to quickly and efficiently recognize learning gaps and apply appropriate interventions.
- Maintain integrity of assessment and instructional tools and resources.
- Improve efficiency of assessment and accountability processes.

- Leverage technology to improve assessment capabilities.
- Enable district, school and instructional personnel to more easily respond to public and parental inquiries and requests for information.
- Achieve buy-in within the districts and KDE initiatives, such as online assessment, Internet 2 and KIDS.

Business Process Change Drivers

As with all government agencies, and especially in education, government entities are continually called upon to do more with less, and to improve the level of services provided to their various constituencies. In addition, performance based or outcome oriented measures of effectiveness are used in government agencies. As a result, a burden is placed on organizations to have efficient business and administrative processes. Education business drivers in the following areas reflect this for P-12.

- Improve administrative efficiency and effectiveness through streamlined business execution and approval processes.
  - RFP development
  - technology procurement
  - contract management
  - capital facilities planning
  - budgeting and planning
- Improve efficiency of enterprise processes through streamlined data exchange, eliminating redundant data entry.
  - aggregating and collecting district and school data
  - validating and correcting data at the point of entry
- Improve grant application and funding processes.
- Improve reporting and aggregating of information.

Partnership/Collaboration Drivers

As a result of cost pressures, but even more as a result of the knowledge that there are a variety of stakeholders who participate in the education process, KDE has recognized the need for public-private partnerships to enhance the ability to meet the organization's mission. In addition, there is growing recognition that inclusion of stakeholders improves buy-in to initiatives and has a synergistic effect, so that the result is greater than the sum of the parts. This is the foundation for the business drivers in this area.

- Utilize technology to foster an environment of inclusion and resource sharing and one that more tightly integrates parents, districts and other external groups, such as higher education.
  - partner with schools and districts in the state
  - facilitate parental involvement
  - facilitate linkage to higher education to enable sharing relevant resources
- Provide leadership on deploying and maintaining local instructional and technological programs.
- Tailor leadership to the capabilities at the local level.

- Leverage breadth of coverage to improve technology support to customers and stakeholders.
- Establish a framework that includes centrally, locally, internally or externally sourced capabilities.
- Use service level management approaches to offer and respond to technology support needs of the unique district environments and further establish the trust that must exist as a partner provider.
- Address the lack of digital parity outside the school, among the districts and with special needs populations.
- Use service and access metrics to measure digital parity.
- Ensure technology is used to overcome barriers and other factors affecting digital parity.
- Utilize more diverse communications channels to reach the broad community of stakeholders and partners in a cost-effective manner.
- Utilize Help Desk and field services.
- Provide updated Internet-based capabilities that are both user-focused and intentions-based.
- Enable special needs populations to interact more effectively among themselves and with other populations.

Funding Drivers

Funding pressures are constant issues that affect the ability to execute the mission of the organization. Overall, state and district budgets have been constrained over the last few years, as a result of tightened economic conditions. Scarce resources drive the need for identifying and adopting new funding strategies, especially for technology-related initiatives. To combat these pressures, the following drivers are recommended.

- Fundamentally shift the way that technology funding is defined and executed.
- View all technology investments with an eye toward total cost of ownership – initial plus ongoing costs – to fully understand the link between today's investment and tomorrow's infrastructure costs and the need for continuous funding.
- Educate districts and KDE stakeholders and partners that have decision-making authority on total cost of ownership (TCO) and its importance in technology funding decisions.
- Enable full funding to maintain the existing infrastructure, while optimizing funding for new education strategic initiatives.
- Consider and take advantage of all possible funding sources.
- Consider a broad range of financing alternatives, including lease financing, outsourcing, debt financing and free operational dollars for technology.

Regulatory Drivers

There are a variety of regulations governing activity in the P-12 education environment. Most of the recent activity stems from changes in accountability driven by the federal No Child Left Behind (NCLB) Act, but that is not the only source. Other regulations, some

resulting from the Americans with Disabilities Act, others resulting from child and family services regulations, and security and privacy concerns also require changes in reporting. In addition, a variety of grant and funding sources require reporting of achievement progress. The bottom line on regulations is that they are projected to continue and even increase in the future. This has resulted in the following business drivers:

- Maintain the flexibility to respond to continuing assessment and accountability regulations, such as NCLB, privacy, and state regulations.
- Provide accurate data and report to external agencies and funding organizations.
- Minimize risk by only allowing those with the necessary authorization and have the "need to know" to access sensitive data.
- Maintain integrity of student, assessment and other data.
- Reexamine policies and regulations that present unnecessary barriers to the work and learning environments at districts and schools.

Implications for Technology

The multifaceted P-12 education environment, with changes coming from a variety of internal and external factors, has several strategic implications for technology and technology management within the state. These include:

- providing technology leadership to ensure the technology-related needs of district and state agency departments are addressed
- embracing a strategic vision for instructional, administrative and operational use of education technology at all levels in the organization – state agency, enterprise-wide and district level
- adopting standards that balance openness with strict adherence to allow for optimal deployment, acceptance and usage of education technology
- minimizing bureaucracy in procurement processes
- adopting service-level management processes to improve the working relationships between education technology providers and business owners
- funding and deploying enterprise solutions that meet state organization technology needs
- considering shared services, outsourcing and alternative service delivery mechanisms to improve deployment and overall support of the education technology infrastructure
- leveraging external capabilities to equalize support and maintenance across the state
- shifting the role of technology resource teacher (TRT) to focus on instructional support and away from the fragmented role that currently exists
- leveraging existing education technology governance entities, and as appropriate, establishing new entities to assist with priority setting, decision-making and effective deployment of technology
  - Technology Planning Council (TPC)
  - Technology Advisory Council (TAC)
  - KETS Architectural Standards Committee (KASC)

- Project Advisory Committees
- Student Technology Leadership Program (STLP) Committee

Technology Solutions and Management Framework

As a result of generating an understanding of the P-12 education and technology environment in Kentucky, we have developed a framework for shaping how technology is viewed, managed and deployed to enable the organization to meet its strategic and operating needs and achieve its mission. This framework is designed to provide a context for aligning the scope of technology activities with the education model, thereby highlighting the strategic importance of certain technology investments and management activities. The framework also will relate the enterprise view of technology.

As mentioned previously, this framework provides both a management and a technology view for P-12 in Kentucky.

- The **Portal** includes the technology access platforms that enable universal, equitable access to educational resources by all stakeholders.
- **Enterprise Functions** provide P-12 education driven applications for the statewide enterprise, state agency or district instructional content and applications, all of which provide technology solutions to support operational requirements.
- **Infrastructure and Shared Services** relate to the shared applications and technology requirements used by all, including e-mail, hardware, software and communications.

The chart on the next page illustrates the alignment between the education model and the technology solutions framework:

Alignment of Education Model and Technology Solutions

Universal Equitable Access to Education Resources

- Widespread, highly distributed access to a information, tools, advice and data supporting instructional, administrative, assessment and accountability processes
- Access and resources available directly tied to role and responsibility

Enterprise Processes

- Leadership and guidance around district- and school-level processes for instructional, administrative, assessment and accountability processes
- Local management and accountability of district-specific operations, such as cafeteria and school nutrition programs, transportation, facilities management and transportation, etc.
- Local processes for State organization-specific processes, such as policy setting, budgeting, etc.
- Ability to aggregate, disaggregate, analyze and report on data collected about student, school, district and State-wide instruction activity and achievement

Technology Infrastructure

- Computing and communications infrastructure to enable local, district and State organization operations and performance management using technology

Portal

- Provide access to KDE and local applications by a wide group of persons
  - Intranet for internal users
  - Extranet for general public and other external parties

Enterprise Applications

- Custom and packaged applications for financial management, HR, student administration, teaching and learning, and assessment needs
- District-specific applications for local processes and district operations
- State organization applications for department processes
- Databases established based on standards

Technology Infrastructure

- Established using established industry standards with a high level of commercially available solutions to encourage and ensure integration and operational synergies
- Inclusive of enterprise operations for district, State organization, administrative and instructional environments
- Leadership around maintenance and support to retain relevance and increase usage

P-12 Education Trends

Technology tends to change at an ever-increasing rate, and for the most part, the issue with organizations is not which technology to choose, but how to get the most from the technology investments made. Key issues facing P-12 lie in the following areas:

- What organizational framework best supports education technology?
- Where does technology fit into curriculum and instruction?
- What technologies are or will be applied to the educational learning environment?
- How can educators recognize, establish and communicate the value of technology in education?

Organization Framework

P-12 technology organizations respond to the needs of a variety of stakeholders, including central staff, administrators, teachers and school staff, students and parents, federal and state government agencies and other public stakeholders. They support and provide technology solutions in five core areas: differentiated content; communications and delivery; productivity tools; administrative data solutions; and curriculum and instructional support solutions.

Typically, technology organizations are organized around the first few of these five areas, leaving those requiring support for curriculum and instructional support solutions to fend for themselves. However, this is the core mission of the education organization, and it is critical that the best practices learned from years of education technology management in administrative solutions be expanded to this area as well.

This plan recommends that the technology organization designate an executive to be in charge of each of these key areas of technology, reporting to the Chief Information Officer, who also is highly placed in the organization (reporting to the most senior levels of the organization).

Role of Electronic Information in Curriculum and Instruction Decision-Making

Technology deployed for curriculum and instructional decision-making solutions is a growth area. As with many other industry and service organizations, technology was first deployed to administrative functions, such as human resources and finance. Today, as a result of regulatory changes driving accountability and reporting, increasing use of standards-based instructional requirements, student information and instructional systems are more central than ever to school districts.

- Data reporting demands of NCLB and the drive for accountability in education has compelled schools to address this area.
- The grouping includes student information systems, instructional or curriculum management systems and learning content and library management systems.
- As with other enterprise-wide solutions, the trend is towards integration of these separate but related areas.
- Interoperability and ability to share information are keys. Two competing interoperability standards are likely to coexist for some time because they meet different needs.

- The Schools Interoperability Framework (SIF) is the data sharing standard for schools. SIF products and a Zone Integration Server can tie together product standardized data services within a district (e.g., SIS data system with cafeteria data system with library management data system).
- Open Database Connectivity (ODBC) governs data access from a variety of database management systems and is an industry-wide standard that does not have an education-specific focus.

This graph highlights investments a variety of school districts have made in the area of instructional support technologies.

Investments in Instructional Solutions – Selected Overview

Location	No. Students	$$ Spent, est.	Description
■ Bronx, NYC, NY	90,000	$5.5 M	Technology integrated instruct on
■ Philadelphia PA	190,000	$13 M	Classroom level tech no ogy; IMS provides real time data that teachers can access rom their desk; :echno ogy for teachers to shape instruction
■ Houston TX	211,000	$15 M	CLEAR irstructional technolbgies: daily lesson plans and other resources that teachers access through portal ; spent $8.7 Vl for laptops for teachers
■ Clark Co., NV (Las Vegas)	280,000	Unknown	Instruct onal data management system access student test results; links instructional technology to standards & school improvement; also has 150 educatio al comput ng strategists
■ Broward Co., FL (Fort Lauderdale)	262,000	$100 M /yr	Electronic text, online lesson plans, part of Broward Virtual education
■ NC WISE	2,264 schools	$200 M	NC Wirdow of informatior on Studen: Education ar extensive studert database that provides information on student attendance, grades, history, and family information
■ Montgomery Co., MD	140,000	Unknown	Ability to easily share information with state developed standards and achievement targets

Source: Education Week 5/5/05, "Technology Counts 2005: Electronic Transfer: Moving Technology Dollars in New Directions"

The chart not only illustrates that a variety of solutions are being deployed, but that significant dollars are being spent, again raising the strategic importance of this area.

Key Technologies for the Education Environment

There are a host of technology solutions being deployed throughout the P-12 education environment, far too many to mention to give them all justice. For each, this plan recommends looking at each potential investment in terms of its ability to enable the organization to meet its mission-oriented delivery goals. However, this Master Plan sees two macro trends driving many technology investments:

- **Anytime, Anyplace, Always On education:** The learning environment is changing, and most learning institutions are moving to a situation in which physical attendance is not a requirement for academic and attendance credit. This trend is both for P-12 students and teachers as they engage in professional development activities. It extends to parents, guardians and other education stakeholders, enabling them to interact and engage virtually with the school district.

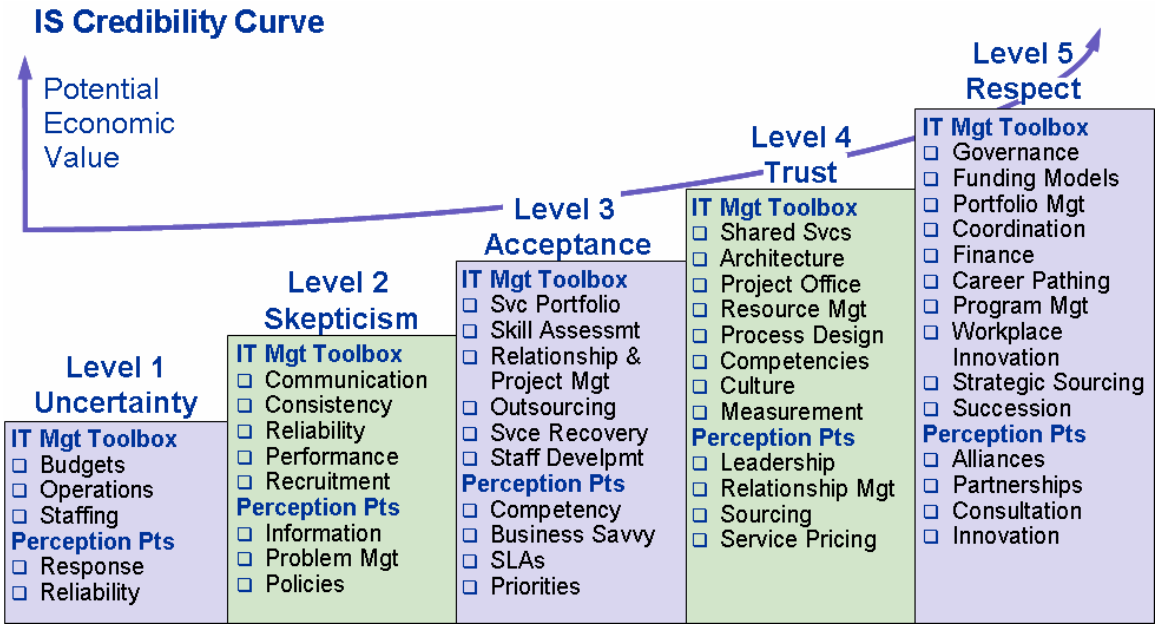
- **Open-source technology solutions:** Interest in open-source software is growing as more organizations envision open-source solutions as alternative models for supplying mission-critical enterprise infrastructure and applications. Tight budgets have focused attention on the high software acquisition costs.

Recognizing and Communicating the Value of Technology in Education

Many organizations are challenged to convey the business value of technology initiatives to gain support and approval of the organization, and P-12 environments are no different.

For P-12, this is a multi-faceted issue, given the traditional dispersion of education technology throughout the organization. The diagram below highlights the IS Credibility Curve and the tools needed to improve education technology's credibility.

Education Technology Services Credibility Curve



In the Education Technology Services Credibility Curve, the credibility of education technology organizations accrues in stages, with each stage depending on programs and practices learned at previous stages and each stage potentially increasing businesses' overall economic value of education technology.

At Stage 1, Education Technology Services Providers are inconsistent and unknown. They do not meet commitments, they make meaningless promises, and they seem impenetrable to the people they serve. At Stage 2, they get their arms around baseline performance and begin to add consistency to operations, services and policies. Businesses remain skeptical, however. Stage 3 introduces professionalism to the picture as Education Technology Services Providers establish processes for responding to education needs and requests and increase education awareness of capabilities. At Stage 4, Education Technology Services Providers define effective processes for

planning, architecture, project management, funding, sourcing and competency development. Educational organizations actively engage in joint planning and measurement. Finally, in Stage 5, leaders actively seek advice, counsel and innovation from Education Technology Services Providers, which have gained the respect of their customers.

Education Technology Services must master practices, programs and alliances that will elevate them from cost centers to business centers. The higher the Education Technology Services credibility, the higher the business value of education technology.

As a result of the gap analysis, the Master Plan has identified a number of initiatives designed to enable the organization to improve the maturity of the education technology function, focusing on education technology providers in the state agency and at the district level.

- Institute a robust governance model
- Implement application and project portfolio management
- Evaluate the organizational structure and enhance governance
- Plan and execute communications
- Implement service-level management capability
- Establish alternative funding models

Appendix C:

Technology Staff and Support Requirements

Support Staff

The following formulas will guide districts to determine an adequate number of support staff:

Desktop Support Staff

These staff support workstations, performing ongoing maintenance and providing break/fix support. They are responsible for software installs and upgrades. To determine the recommended number of desktop support staff, divide the number of PC's by the "scale factor".

# PC's and connected devices	<1,000	1,000 – 5,000	5,000 – 10,000	>10,000
Scale factor	48	182	204	252

Example: 2,000 PC's = Desktop support staff of 11 (2,000/182 = 11)

LAN/Network Staffing

These staff support network operations. To determine the recommended number of LAN/Network staff, divide the number of PC's by the "scale factor".

# PC's and connected devices	<1,000	1,000 – 5,000	5,000 – 10,000	>10,000
scale factor	206	464	462	728

Example: 3,700 connected devices = staff of 8 (3,700/464 = 7.9)

Help Desk Staffing

These staff provide first level support for the hardware and software. To determine the recommended number of Help Desk staff, divide the number of average monthly calls by the "scale factor". *Note: *If the number of calls is unknown, assume 25 calls per user per year.*

Calls per month*	<1,000	1,000 – 3,000	3,000 – 5,000	5,000 – 10,000	10,000 – 15,000
Scale factor	160	289	373	379	477

Example: 2,600 calls per month = staff of 9 (2,600/289=8.9)

Using the formulas provided above, a district with 3,600 devices connected to their network (3,000 workstations, 150 servers, and 450 printers) and generating 6,000 help desk inquiries per month would require the following staff:

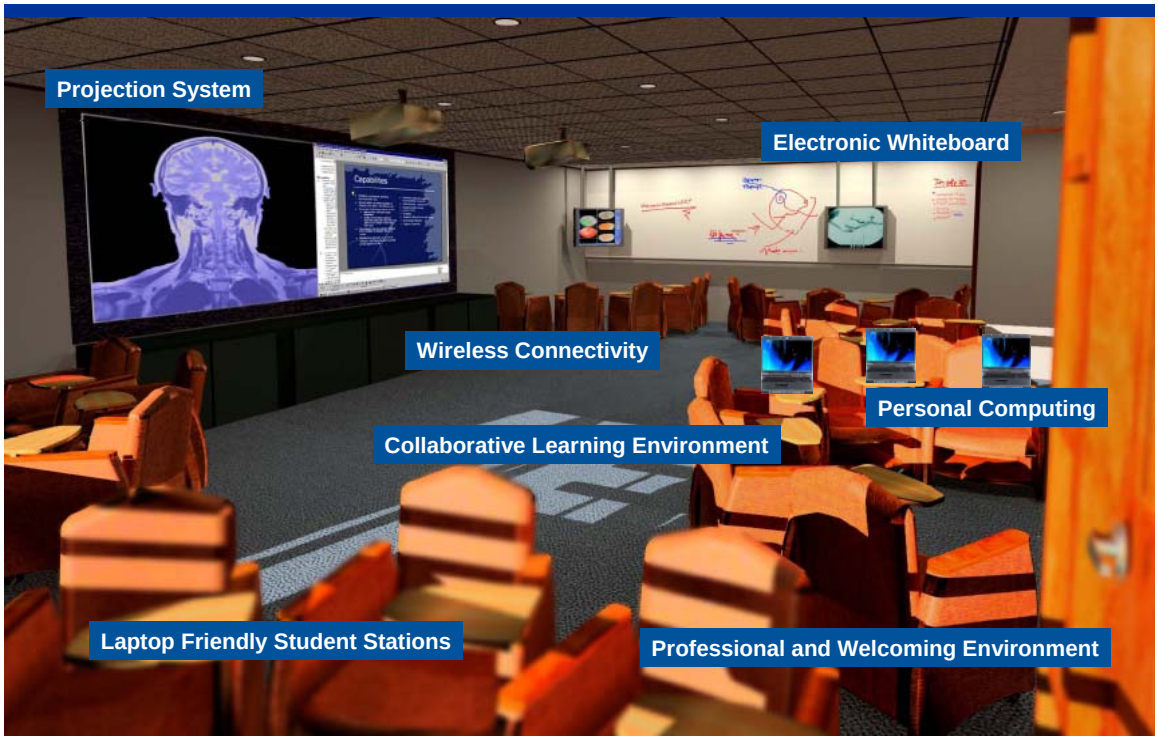
	Formula	**Staff Needed**
Desktop Support	3,600/182	20
LAN/Network Support	3,600/464	8
Help Desk	6,000/379	16

Appendix D:

Major Initiatives and Projects

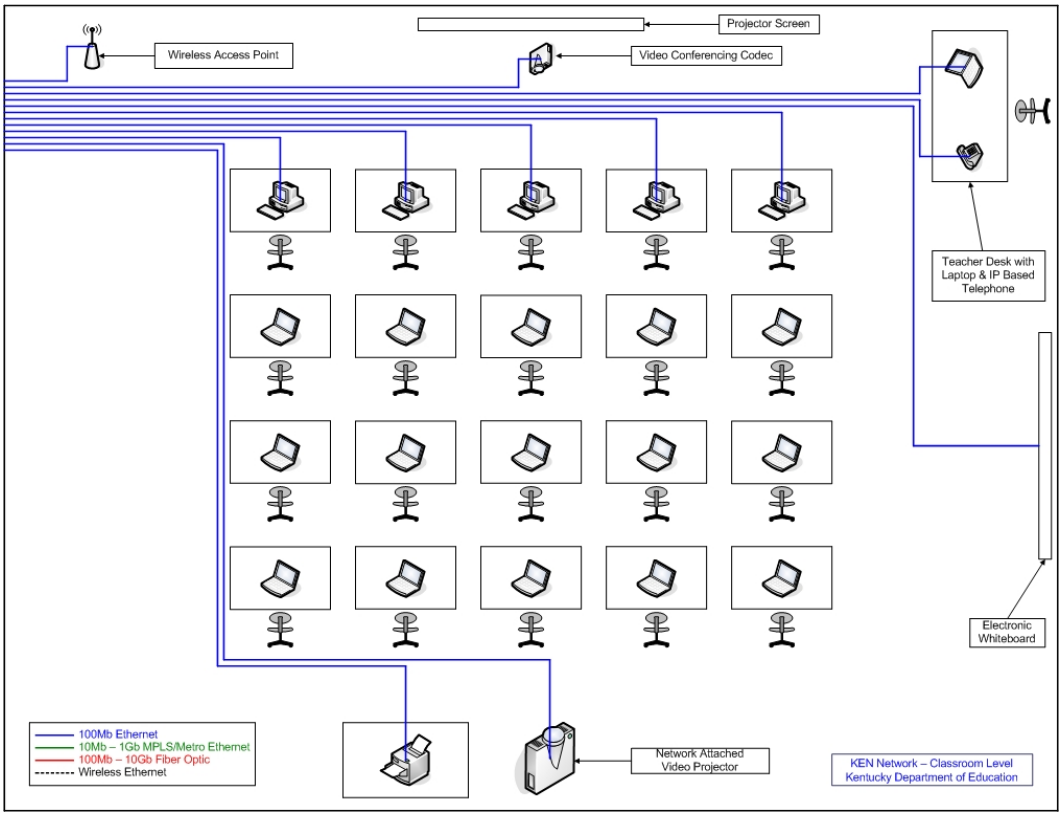
Access to Valued Instructional, Collaborative and Communication Resources across All Parts of the Curriculum

Intelligent Classroom and Differentiated Collaboration Tools

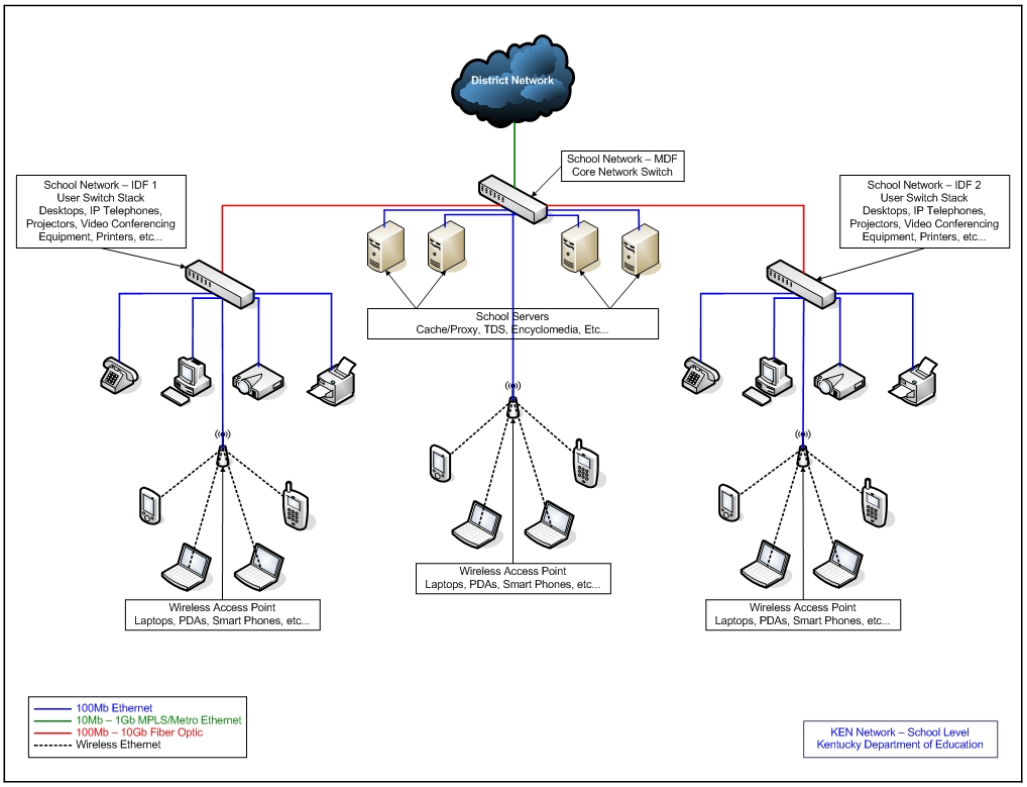


Major projects under this initiative: Internet 2, Next Generation P-12 Virtual Learning Environment, Desktop Conferencing, Content and E-mail Management

Kentucky's goal is to provide a supportive instructional environment where students use the latest and most advanced learning methods. In order to achieve this supportive instructional environment, schools must integrate technology across the curriculum to transform traditional classrooms into dynamic learning environments.



Classroom



District

Internet2 (www.internet2.edu)

Internet2 is a research and development consortium led by more than 200 U.S. universities working in partnership with industry and government to develop and deploy advanced network applications and technologies, accelerating the creation of tomorrow's Internet. Initial operation of Internet2 began in February 1999.

Only the University of Kentucky and University of Louisville are members of Internet2, with access via the Abilene backbone. The Sponsored Education Group Participants (SEGP) program, initiated in 2001, allows expanded access to Abilene for state and regional networks, through sponsorship by Internet2 university members. State and regional networks may include non-profit and for-profit P-20 educational institutions, museums, libraries, art galleries or hospitals that require routine collaboration on instructional, clinical and/or research projects, services and content with Internet2 members or with other sponsored participants.

In 2005, under the sponsorship of the University of Kentucky, Kentucky joined 34 state P-12/P-20 networks participating in the SEGP program. This opens Internet2 access to comprehensive universities, KCTCS, P-12 and the Education Cabinet.

Next Generation Virtual Learning Environment

By implementing the next generation virtual learning environment, Kentucky will continue to receive the direct cost-savings benefits previously delivered by the Kentucky Virtual High School. Reduced out-of-pocket costs for travel and similar expenses will result.

There are other benefits for school populations including:

- Students have global access to the online courses, as well as improved access to a full curriculum. This makes scheduling easier for students, since they have more flexibility when selecting their courses. Additionally, the state can share master teachers across the districts, which gives students increased access to specialized teaching regardless of location.
- Teachers have global access, flexible schedules and job-embedded professional development. Teachers may access professional development that may not be available in their areas.
- In schools and districts, council members and administrators can take courses to improve their capabilities, thereby helping the school maintain more competitiveness. Student dropouts can access online academies, helping improve graduation rates and addressing individual learning styles and preferences.

Key Considerations:

- Currently, the virtual learning environments in the P-12, Higher Education and Adult Education areas operate independently. This initiative must reduce and coordinate the educational processes and may require governance and decision-making changes in order to be successful.
- Virtual learning educational technology has matured. However, this application may have scale differences -- geography and potential number of students -- from most applications. Scale refers to how many students and teachers are accessing the system at the same time. For instance, the scale of the application must be larger if additional students continue to use it.

- There may be significant data conversion costs when a new service provider is selected. Data conversion refers to loading all of the old data into the new system, which can be difficult and quite time-consuming.
- There are large linkage needs to the existing educational technology systems that the state uses today.

E-mail and Content Management

This initiative will provide guidance for e-mail and Internet content management for the P-12 educational environment.

E-mail content management has become a growing concern across the KETS enterprise. KDE has implemented a multi-layer approach specifically targeting four different functional areas:

- **Content monitoring** – Compares all inbound and outbound e-mail activity for each individual user to a standard set of key words or phrases and reports inappropriate usage to designated personnel. These applications typically do not block or filter information but rather report against keyword violations.

- **SPAM management** - Prevents unsolicited, unwanted, irrelevant, or inappropriate messages, especially commercial advertising in mass quantities, from being sent to end-users. These systems actually block and filter e-mail against a standard set of key words or phrases. The lists of key words or phrases are provided by external organizations and are updated on a daily or weekly basis based on the current known SPAM initiators and techniques.

- **Access management controls** - Limits the audience to which an end-user can send e-mail or from which an end-user can receive email. All enterprise-class e-mail systems, including Microsoft Exchange Server 2003 used by KDE, include features that allow system administrators to determine who has the ability to send or receive e-mail. Access Management controls do not block or filter any information, but instead limit access.

- **Content filtering** – Compares all inbound and outbound e-mail or Internet activity for each individual user to a standard set of key words or phrases and blocks or filters the inappropriate content from being sent or received.

Note: It is important to recognize that the industry average for effectiveness of content management applications currently stands at 97%. There are no companies, which either claim - or guarantee - that 100% of all inappropriate email can be blocked, filtered, or quarantined. It is important to remember that any system or solution can be compromised by someone with the skill, opportunity, and determination to do so.

No pure technology solutions can guarantee full protection from inappropriate content or behavior. The most effective approach includes a proper balance of both internal policies and proactive monitoring to compliment the technology solution. Electronic communications provide no greater - or less - risk than verbal or written communications and should be managed in the same manner. This includes leveraging existing policies and procedures regarding inappropriate behavior.

Continuing Professional Development for KDE and District Staff

The TRT/TIS program is one component of KDE's overall professional development strategy. Other forms of professional development must enhance the TRT/TIS program. The TRT/TIS program is appropriate for certain topics, but by stepping back and assessing other professional development programs, KDE can improve the overall effectiveness of professional development within the state.

A priority should be to analyze its professional development content to determine which portions are appropriate for the one-to-many format. The use of educational technology to support these programs should then be assessed to determine how to best provide access to specialized professional development resources.

TRT/TIS, classroom and self-directed training all come with their own benefits and risks. Successful educators and leaders will draw from a training portfolio of all three types, using the advantages of one to balance the others. Well-planned educational development-training programs will, for instance, use informal training to reinforce principles learned through formal, classroom education.

Key Considerations

- Educational technology must be used in order to enable training sessions and/or courses to be accessed by a large audience
- Improve access to highly specialized professional development resources by using educational technology and including as many district teachers and administrators as possible
- Use new training technologies, such as computer applications and Internet training, to provide information on demand
- Offer databases of shared knowledge, and deliver just-in-time training that crosses traditional geographic boundaries
- Maintain an up-to-date reference library and knowledge base to better support self-directed training
- Classroom training is best used for single-objective lessons and when minimal disruption is required
- Knowledge gained through classroom training may not easily transfer to an on-the-job setting. Reinforcement of learning will be required

Document and Content Management

The scope of the initiative includes:

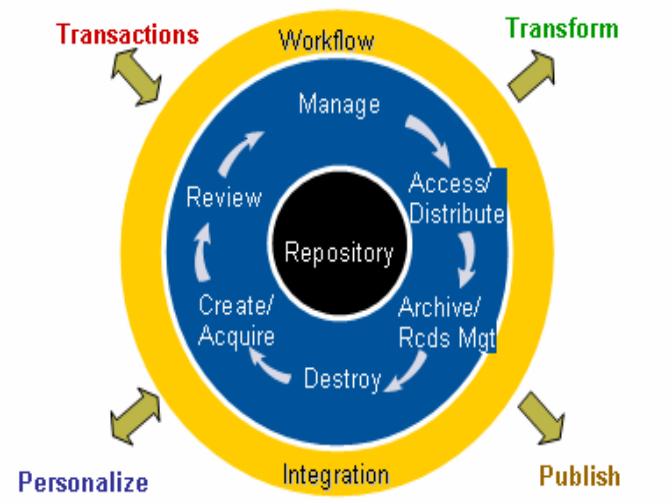
- Defining the types of content to be available to educational technology support staff and the guidelines around what will be shared
- Defining the operating model and the supporting technology components
- Developing an Enterprise Content Management program that aligns with the needs of the schools, districts and state agencies
- Developing a business case that defines the costs and benefits

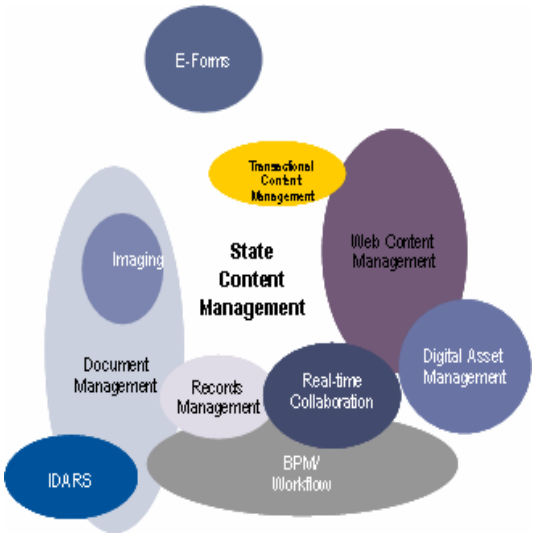
Key Considerations

- Schools, districts and state agencies will have to establish ownership, roles, responsibilities and funding

- The needs of schools, districts and state agencies will have to be understood in order for this initiative to deliver maximum benefit
- A mechanism to monitor success must be developed
- Security and access to knowledge management sharing must be balanced

Document and Content Management





Next Generation Student Information System (SIS)

The recent use of a code, or identifier, that uniquely identifies every student assists KDE and districts in sharing student information across the districts. This system is the main source for student information (grades, attendance, demographics, health immunization records, school safety information and participation in special programs such as gifted and talented).

Individual Learning Plan (ILP)

Major activities involved in this project include:

- Complete the design standards and required specifications for the Web-enabled electronic individual planning tool
- Conduct a competitive RFP and select a Web-enabled individual planning tool for schools that is fully functional
- Incorporate student assessments, needs, interests and supports
- Interface with Higher Education's "Go Higher Kentucky" system
- Develop and begin delivery of a professional development framework to support implementation of the electronic plan
- Advertise, champion and encourage districts to implement and use this tool on large scale

Kentucky Instructional Data Systems (KIDS)

KIDS will provide:

- Students a better understanding of how well they are doing and provide opportunities to make changes to their curriculum if necessary
- Teachers the opportunity to change the way they teach a particular group of students
- Parents more information on grades and schedules
- Administrators the benefit of spotting trends (both good and bad) early on and oversee assessments of how teachers are teaching their classes
- KDE better NCLB reporting and compliance capabilities

The scope of this project includes:

- Integration with many source systems, such as student information and instructional resources
- Supporting the goals of the federal grant, which include better methods of reporting for NCLB
- Tracking student performance based on their assessments and the analysis of teacher instruction
- Ability to merge results from online assessments, formative assessments or packaged assessment solutions
- Strong security needs due to data privacy requirements

Note: To be most effective, data standards to support the exchange of data between the SIS, financial management and other systems will be required.

Knowledge Management Portal

The scope of this initiative includes:

- Identifying and establishing portal capabilities
- Making online sharing of documentation and ideas possible
- Linking with many educational technology systems, including student information and instructional resources
- Strong security needs because of data privacy requirements

Key Considerations

- Being successful requires a strong portal strategy, so that it becomes a foundation of future Internet or intranet projects
- The known network limitations are a constraint
- Training and professional development are essential
- Identity management is key to this initiative

A knowledge management portal is a personalized way of accessing documents and information via the Internet. The Web site would recognize whom you are when you log in and would be smart enough to know if you were a teacher, a principal or a student. It would then display information based on your profile.

Reading First/Read to Achieve

Currently, KDE and districts use several different online databases to manage and monitor the Reading First and Read to Achieve early literacy program. Databases include those provided by the Collaborative Center for Literacy Development (CCLD), DIBELS, Terra Nova, SIS and GRADE. The objective of this initiative is to link the information together for reporting and program management purposes. Some of the key benefits include:

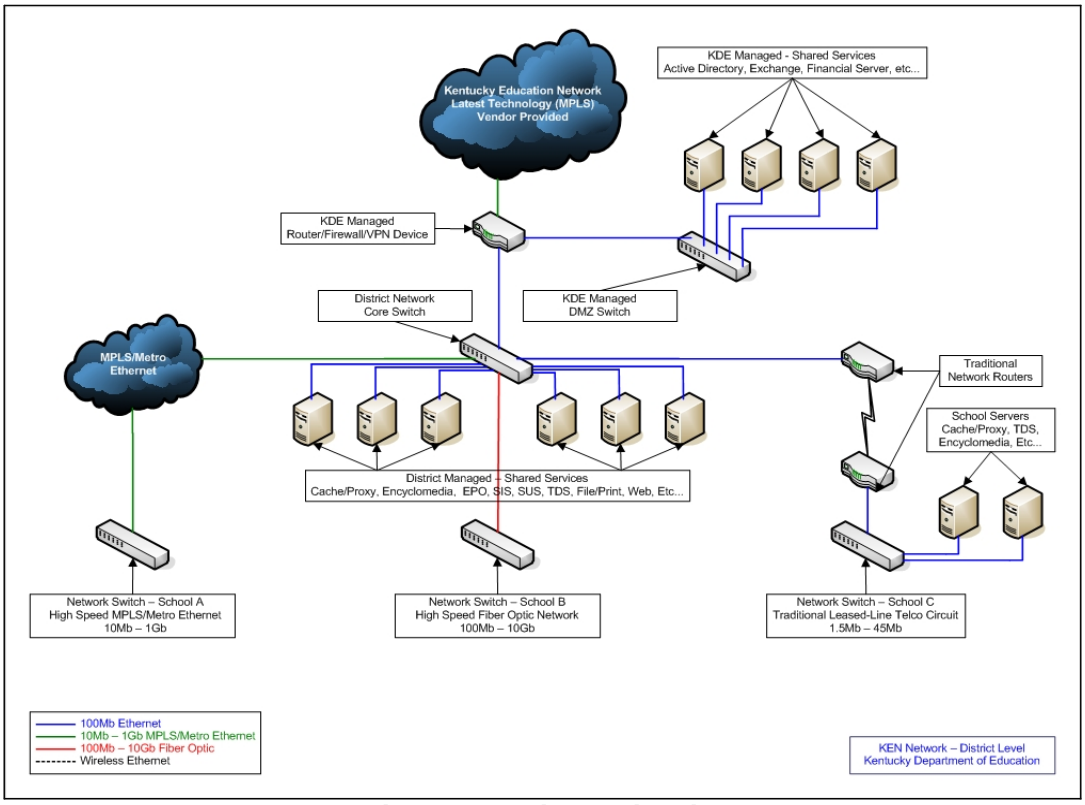
- Schools will no longer have to piece together many reports, removing duplicate data entry
- Smaller districts will have the same level of access as larger districts
- KDE and districts can focus on the actual program work, rather than managing the data
- KDE and districts can efficiently monitor progress
- Future requests of a similar nature from the federal government may be more easily addressed

Kentucky Education Network (KEN)

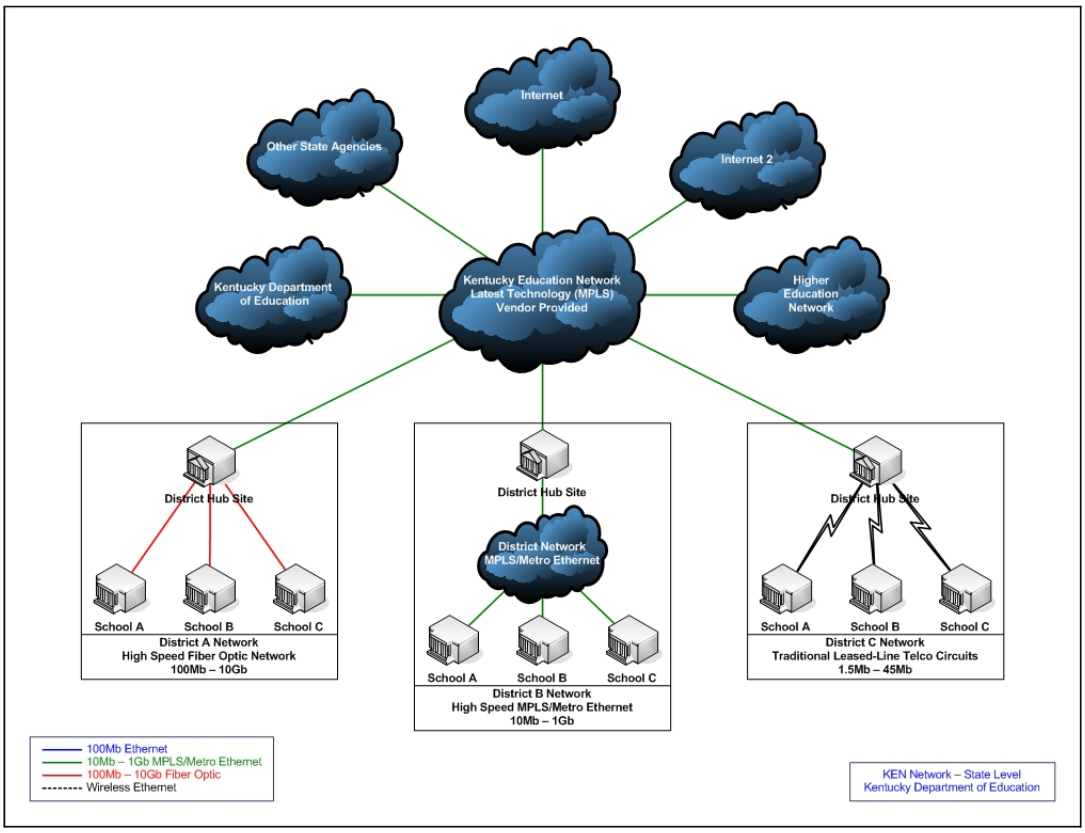
This initiative addresses the urgent need at the school, district and state levels for increased bandwidth. The bandwidth supplies the many systems used throughout the state and to satisfy the large demands being asked of the current network by students, teachers and educational staff members.

As the capabilities of the newer educational technology systems increase, and online content needs change to include new media, the current network capacity is reaching its maximum level. Specifically, this high usage, along with the inability to expand the network quickly, is a large concern that must be addressed.

The objective of a WAN/Networking Strategy is to understand and document the current abilities, vision, charter (scope), roles and responsibilities, educational requirements, technical considerations and gaps.



KEN at the K-12 and state level



K-12 and other state agencies

This initiative is a top issue identified by the Kentucky Commissioner's Technology Advisory Council as schools' use of technology increases. The scope of this initiative would address:

- Requirements assessment
- Remand and capacity planning/utilization
- Various alternatives to meet current and projected demand
- Costs and linkage to existing efforts, including the state government and university networks
- An appropriate phase structure for the implementation of increased capacity
- Inconsistent Internet access capabilities/demand (rural areas and low-technology adopters vs. urban areas and early adopters)

Key Considerations

- Enablers include defining establishing ownership/roles and responsibilities/governance, as well as funding
- Various topologies and associated costs should be considered
- Networking tactical execution and strategic goals for P-12 should be aligned
- This initiative is directly linked to governance, enterprise architecture, capacity planning, instructional and assessment application enhancements, portal and knowledge management
- Instrumentations and processes to monitor and evaluate utilization, needs and quality should be included
- Implications of differentiated service delivery should be assessed
- Balance service flexibility while maintaining "equity of access" integrity

Education Technology Security/ISA 2006

Three primary reasons for this change are:

- Using higher-capacity or faster computer networks reduces the need for caching. One example of caching is storing copies of Web sites, so that if a user visits a Web site more than once, the page is already in the computer's memory and does not have to be downloaded again.
- The proxy server is at the end of its useful life. A proxy server manages access to Internet-based content such as sites and chat rooms.
- There are statutory requirements to provide Internet management ability to local school districts.

Education Technology Security Backup System

This initiative will close a specific disaster recovery gap. The scope includes:

- Developing a strategy and detailed plan on how best to move forward
- Services for school districts, such as active directory, e-mail system, education enterprise database system, student enterprise data collection system and KDE systems

Identity Management

Currently, identity management (IDM) has a large impact at the statewide and local levels.
Several current statewide applications (financial management and SIS), as well as many proposed applications, will be most effective when an identity management solution is implemented. Each staff member will access the systems with a single user ID. This will be quite a challenging task, because the applications include homegrown, internal, off-the-shelf, hosted internal and vendor-provided external applications.

Local districts utilize many systems to manage their business, such as data warehousing, finances and transportation. In order to allow staff to be more productive, these applications must utilize a common ID for each person who uses them. Additionally, this will provide a common policy and process to help users understand how to log in to each system.

Several new initiatives will rely heavily on and provide more value to students and staff by utilizing identity management. These include KIDS and online assessment, both summative and formative.

Security and Authentication Planning

In order to address security and user authentication, schools, districts and KDE will focus on the following:

- Policy and standards - The state must build security into its educational policies from the beginning
- Architecture - The ongoing decisions to use new computers, servers, networks and applications must be balanced against how they serve the educational staff and their costs, as well as against the impact that the new technology will have on educational technology security.
- Awareness - The schools, districts and state agencies must develop awareness and education programs so employees know their security responsibilities and are always reminded of changes to those responsibilities as educational technology changes.
- Security products - Educational technology staff must understand security products.
- Decision-making processes -There must be an audit, investigation and monitoring program that is designed to focus on security standards, processes and education. A security program without teeth is not a valuable program.

The strategy developed in this initiative will be a foundation for all KDE offices and divisions, as well as districts and schools. It will provide a common view of security throughout the state. The security program must be ongoing and rapidly respond to new threats and vulnerabilities.

Intelligent Classroom

Students and teachers in Kentucky have would like access to many technology tools available for today's classrooms. These tools include two-way video desktop conferencing, electronic projection and whiteboards, interactive student voting for formative testing, wireless, phone conversations over Internet, Instant Messaging (IM),

speech recognition, large-scale e-books, electronic paper and grid computing. Using these technology tools while being managed by technology-knowledgeable teachers, students can develop the ability to take charge of their own learning and can perform work at their own paces through differentiated learning. Ultimately, technology can allow children to develop at their own paces, learn in a way that is most beneficial for each student and meet the goals of the state's curriculum requirements.

This type of advanced learning necessitates teachers who bring a fresh perspective to instruction and are supported in their use of educational technology. Schools and classrooms, both real and virtual, must have teachers who are equipped with technology skills, have direction from a number of professional development resources and who are, as a result, motivated and excited by educational technology. By utilizing the previously mentioned tools, teachers can effectively teach the necessary subject matter content while incorporating technology concepts and skills. Educational technology should provide students with real world experience by exposing them to independent source material, critical problem-solving analysis and unprecedented collaborative tools.

Kentucky understands the importance of providing every student with a classroom environment that emphasizes modern technology in every classroom, a connection to the information superhighway and diverse online resources. By making this vision a reality, students will achieve proficiency and be prepared to continue on to and succeed at higher education, business, the military or any other endeavor they choose to pursue.

It is the goal within the state of Kentucky to provide a supportive instructional environment where students utilize the latest and most advanced learning methods. In order to achieve this supportive instructional environment, schools must integrate technology across the curriculum to transform traditional classrooms into dynamic learning environments.

Using these technology tools, and being managed within the classroom by technology-knowledgeable teachers, students can develop the ability to take charge of their own learning and can perform work at their own pace through differentiated learning. Ultimately, technology can allow children to develop at their own pace, learn in a way that is most beneficial for each student, and meet the goals of the state's curriculum requirements.

This type of advanced learning necessitates teachers who bring a fresh perspective to instruction, and are supported in their use of educational technology. Schools and classrooms, both real and virtual, must have teachers who are equipped with technology skills, have direction from a number of professional development resources, and who are, as a result, motivated and excited by educational technology. By utilizing the previously mentioned tools, teachers can more effectively teach the necessary subject matter content while incorporating technology concepts and skills. Educational technology should provide students with real world experience by exposing the children to independent source material, critical problem solving analysis and unprecedented collaborative tools.

Kentucky understands the importance of providing every student with a classroom environment that emphasizes modern technology in every classroom, a connection to the 'information superhighway', and diverse on-line resources. By making this vision a reality, students will achieve proficiency and be prepared to continue on to, and succeed

at, higher education, the business community, the military, or any other endeavor they choose to pursue.

Video Conferencing (Desktop and Large Group)

The objectives include:

- support for employees
- facilitating the meetings
- enabling electronic transmission of video for Signed Exact English (SEE) and American Sign Language (ASL)
- making it possible to provide video to every classroom and residential suite and to include third-parties
- provide a communication channel for students and their parents

Eventually, this will expand to every school district in the state. This has a direct impact on the broadband delivery issue, which is how large files, such video files, are transmitted to all schools within the state for student use.

The initial stage of this initiative will be located only at KDE and KSD. Expansion of these capabilities throughout the state may be phased in.

This initiative should link with other assistive educational technologies as needed, and may require a comprehensive plan that considers the entirety of the needs of all special populations.

Consolidated Program Monitoring

Each program has at least one person responsible for compliance monitoring. Compliance monitoring typically includes reporting on how the allocated funds (entitlements) are used and program success, focusing on outcomes and results.

Each program has its own unique monitoring tool or system. The scope of this initiative is to reduce these tools and processes to:

- Allow for complete reviews of each district in order to ensure that no district is left with too many program audits, compared to other districts
- Make it easy to have a complete picture of the student population participating in all programs and the ability to focus on any given portion of students and examine the effectiveness of all the programs in which they are involved
- Have a thorough view of the overlapping processes and the information being gathered. If similar data is being collected in more than one location, it could mean that there are many systems performing the same functions. Too many systems translates into higher training costs and numerous and specialized support skills
- Provide links to other KDE systems, such as SIS
- Comply with federal requirements for monitoring and oversight

School Facilities Inventory

An issue is that the data is difficult to update using the tool. The present tool uses flat files and MS Excel, and the whole process is manually intensive. It takes too long to accomplish what the user wishes to achieve, and specialized skills are required to use the tool.

The users of this tool include districts, superintendents and staff, local planning committees, architects and engineers. Other potential users include emergency management and the school report card system.

The current improvement goals for this project include a tool that has a more robust technology and to enable users to access the tool using the Internet. It is very important that this project include standardized data and the functionality that the users need. The scope of this initiative includes:

- Building age and individual spaces information, renovation dates, condition, status of the facility
- Broader information on each of the facilities, such as the total number of preschool classrooms
- Ability to report on the state/condition of the buildings and facilities at the building, district and state levels
- Up-to-date information and the ability to keep it current and run both pre-defined and ad hoc reports
- Ease of use and understanding by a variety of people of various skill levels throughout the state
- Ability to grow with the needs of the schools and districts
- Establishing a tool that is equitable for all districts

Hardware/Services Consolidation

Additional savings may be gained through consolidation of areas such as Web presences, intranets and SQL capabilities for KDE's Offices of Assessment Accountability and District Support Services, including Nutrition and Health Services, and the Kentucky School for the Deaf and School for the Blind.

The initiative includes developing a business case to show the value of consolidation including:

- Lower TCO (Total Cost of Ownership)
- Fully-staffed support services
- Improved disaster recovery
- Integration with single login source
- Statewide virus protection and password management
- Reduced facilities costs

The development of some consolidation plans already has occurred, but a lack of funding has limited progress. Additionally, in order for the server consolidation to offer value to the schools, districts and state agencies, service-level agreements will be required. Service-level agreements are detailed written agreements between the educational groups and the educational technology providers regarding the exact nature of the services that educational technology providers deliver.

It also would be wise to think about what metrics, or measures, will be used to track the progress of this initiative, as well as new governance structures required in order to receive maximum benefit from this initiative.

Capacity Planning

The lack of formal process and strategy is the largest single flaw in current capacity management efforts. KETS will implement a baseline assessment and develop a strategy to address capacity planning to manage resources, scope, cost, risk and schedules efficiently.

Areas for capacity planning would need to include the following capabilities:

- Data centers
- Servers
- Storage
- Backup
- Network
- Desktops, laptops, other client devices
- Application rationalization

Key Considerations

- Define ownership/roles, responsibilities/governance and funding
- Align capacity planning to strategic goals for KETS, while also considering funding and growth/attrition
- Instrument, monitor and evaluate success metrics
- Assess implications of the differentiated service delivery model
- Leverage the refresh cycle to manage the capacity of service

Differentiated Service Delivery Model

Differentiated service delivery provides more than one type of service, typically according to the amount of needs of customers -- in this case, KDE, the district offices and schools. At the moment, the state and district staff offer shared services, which means that the state and district provide certain educational technology services, and those services are less expensive because the costs are shared. The services, however, are the same for all districts and schools, regardless of the amount of need.

Benefits are created through using a single group to provide services to multiple agencies or units, rather than requiring each to provide the service on its own. This is a proven practice that is commonly seen in the business community. KETS will realize benefits from combined economies of scale and the ability to negotiate pricing from a larger purchasing base. The use of common business processes that are aligned with the unique needs of the districts will deliver the greatest benefit.

KETS must organize resources around services and processes, rather than technologies, in order to ensure that all KDE staff, districts and schools have a positive service experience. Merely centralizing does not make an organization a shared services organization.

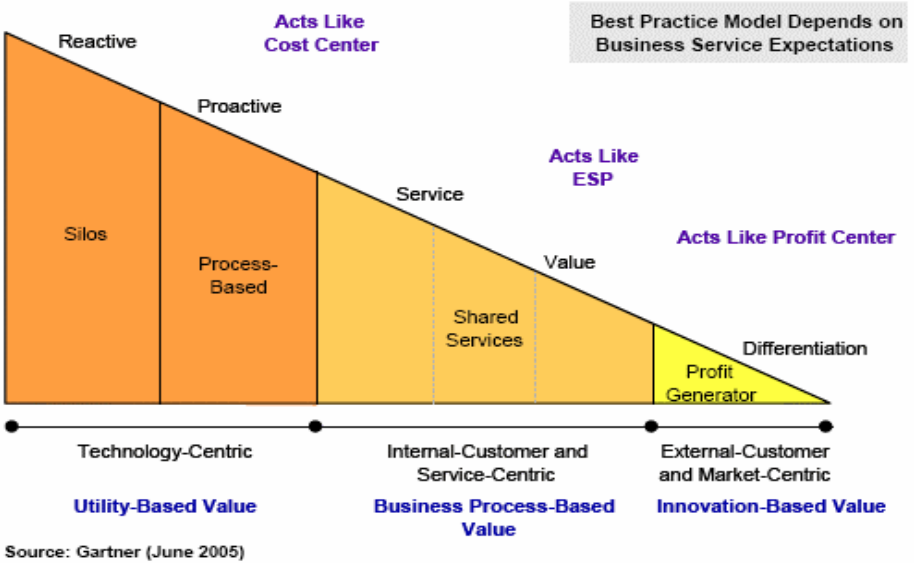
The scope of this initiative includes establishing a balanced scorecard for the educational technology, where financial performance, educational technology operations, personnel and customer service would be evaluated.

Key Considerations

- Prepare for the potential of pushback from customers on their level of categorization
- As offices, schools and districts evolve, re-categorize the districts according to the differentiated services framework
- Include a method to evaluate levels of satisfaction at the school, district and state agency
- Define governance and funding support
- Understand the effects on educational technology application support, the TRTs and district educational technology staffing
- Minimize service disruption during transition

Service Delivery Models

Figure 1. Service Delivery Models: IT Maturation Path



Source: Gartner (June 2005)

Performance-Based Service Delivery

Educational technology providers will work to understand the districts' exact needs and re-think the types of educational technology services that are delivered. Examples of re-thinking educational technology include providing schools and districts with clear expectations of who is responsible for certain services and how those services will be provided.

It also involves active and regular communications with the schools and districts to evaluate their satisfaction with the educational technology services. The feedback is then used to tailor the services that the educational technology providers offer and to improve the process on a regular basis.

The ISCo (internal service company) model is a competitive business model for educational technology providers to demonstrate and improve the way they serve schools and districts. It has several characteristics that are not common to most internal providers and requires a serious leadership commitment to long-term change.

The ISCo model really involves treating the educational technology provider as an external company, instead of an internal part of KETS. Schools and districts would compare the services that they are receiving to services that external vendors might offer.

ISCo provides:

- a business and financial outlook on all service, process and sourcing decisions.
- an external customer focus, rather than an internal technical focus.
- the willingness and ability to focus on delivering excellent service using well-trained people.
- a competitive funding and chargeback model that uses price and value instead of cost.
- proactive relationships with the schools and districts.
- a service catalog/portfolio. A service is defined in terms of value to a school or district and describes items such as scope, depth and breadth of services offered. For example, it should consider whether the service would be a one-size-fits-all offering or whether different services will be offered for different groups of customers.

Application and Project Portfolio Management

Project portfolio management looks at all of the projects that are ongoing, as well as those under consideration, and decides which projects will deliver the most value to the schools and districts. There is never enough funding to take on every project, so it is important to develop a process to decide which projects should have priority over other projects. This also includes streamlining investment decision making.

One of the best ways to manage a portfolio of projects is to have regular meetings with decision-makers who have received input from the schools, districts and KDE staff. This is one of the most important goals of this initiative -- schools and districts must be able to communicate their goals, challenges and needs to the decision-makers. That is why this initiative is closely tied to the governance initiative -- if an excellent governance process has been agreed upon by KDE, the schools and districts, it will be much easier to share the goals and understand which projects will help contribute to those goals.

It is also very important to look at all of the projects and applications in the same way. The decision-makers must understand what the schools and districts require and then evaluate the projects using consistent criteria. Decisions can then be made that will directly improve the way educational technology supports the students, teachers and principals in the classrooms, schools and districts.

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Key Considerations:

- Clearly defined educational goals
- Assuring that educational technology investments are aligned with educational goals
- Proper enterprise architecture and a Program Management Office organization
- Portfolio management strategies, which can reduce educational technology costs, but, more importantly, provide long-term balance to educational technology investments
- Tools, such as project and portfolio management applications

Streamlining Education Technology Investment Decision-Making

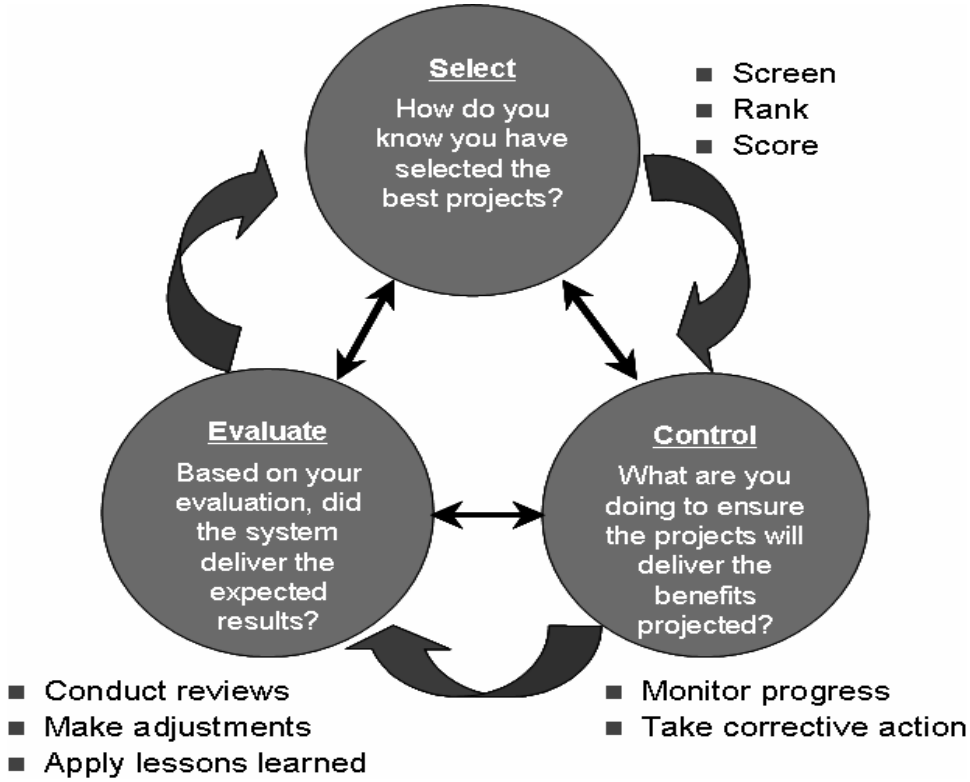
The scope of this initiative includes improving the timing and effectiveness of the state agency educational technology selection and approval processes.

States with poor educational technology investment management drive slow, complex and underperforming decision processes. This can result in lost opportunities and higher costs. Typical issues that most educational technology organizations need to avoid are decisions that are too complex, take too long and are made by the wrong people for the wrong reasons.

Proper educational technology investment management delivers a formal decision-making process for new educational technology investments. It provides for a structured review for all new, in progress and ongoing or legacy investments. It also provides for an evaluation process for all ongoing operations and maintenance investments. Additionally, it will enable continuous improvement, institutionalize the education technology investment management process so that it is integrated into the budget and strategic planning processes and establish a balanced education technology investment portfolio.

KETS must ensure only key projects are considered, and that minor details and decisions are not extensively debated to the detriment of the districts or KDE. An improved decision-making process will bring clarity about processes and roles and will establish decision participation and priority. This initiative also involves external service providers and other key participants.

Selection, Evaluation and Control



Procurement Strategy

As KETS transforms its procurement organization, its focus should shift towards the automation of transactions and the use of reporting to highlight exceptions. This strategy also includes leveraging alternative funding mechanisms.

Ultimately, procurement best practices reduce costs, improve service to school, district and state customers and increase strategic focus. This initiative involves leveraging district procurement bodies such as the regional district purchasing co-ops.

The success of statewide educational technology procurement is affected by several challenges. The benefits of educational technology might not be fully realized because what organization buys or the method it uses to make purchases might be wrong.

Of the key goals in the transformation of procurement, the guiding principles will have the most significant effect on long-term success. If the principles truly support the students, teachers and state agencies and deliver benefits to all, then those people will accept some of the constraints on their purchasing freedoms that the procurement model may impose. If, on the other hand, the guiding principles seek to create success only for the procurement group, without considering what is important to those who are

in the schools and districts, then the effort will fizzle out after the initial cost-cutting victories.

Key Considerations

- The procurement group must evolve from transactional to strategic
- The KETS procurement governance model must directly involve representatives from the school, district and KDE levels
- Total Cost of Ownership (TCO) must be utilized to properly assess true cost

Sample activities include:

- Determine state procurement goals
- Review current procurement organization and processes
- Collect supplier and category spending data
- Define strategic sourcing goals
- Define contract management goals
- Assess category spending data
- Consolidate suppliers and identify strategic suppliers
- Create future state procurement processes based on business goals
- Automate transactional procurement processes
- Use exception-based reporting to pinpoint problem transactions, rather than reviewing each transaction
- Assess procurement personnel skills against strategic sourcing and contract management requirements
- Track against key success measures:
  - Administrative costs (per PO, per invoice)
  - Cycle times (time to delivery, time to financial settlement)
  - Percent of automated vs. manual settlements
  - Number of suppliers, number of transactions
  - Percent of on-contract vs. off-contract purchases
  - Customer satisfaction

Leverage Alternative Funding Mechanisms to Upgrade Infrastructure

By using alternate funding mechanisms, KETS can maximize the effectiveness of its educational technology by upgrading its aging computers and servers.

Currently, KDE and school districts are largely responsible for funding current educational technology operations for the schools and districts. The operations include ongoing telecommunications costs, hardware and software maintenance, refreshing and upgrading hardware and software.

In the last plan, these costs were estimated to be $122 million per year and are covered by traditional sources such as state funding for operating budgets; local funding for district-specific initiatives and a combination of grants, federal funding and state funding.

These allocations traditionally have not been sufficient to fund both current operations and new educational technology investments. In addition, the funds are allocated to the districts in a way that allows flexibility on the part of district management to under fund technology operational needs. For the first time, the biennial budget preparation this year included estimates of and allocations for educational technology capital

investments. This is an example of the kind of innovative funding mechanisms that this initiative is intended to identify.

The scope of this project includes:

- Evaluate the potential of other innovative funding options for the state, including but not limited to, capital investment funding, lease financing and sourcing related options. Develop pilot programs to implement those found to be most appropriate.
- Implement educational technology investment management practices that include a total cost of ownership (TCO) approach.
- Evaluate the potential for open source solutions to reduce total costs of ownerships
- Conduct procurement and educational technology sourcing assessments to identify procurement options that may free up cash for the state.

Governance

Governance can be described as the way that groups of people or organizations make decisions. In Kentucky, providing education to children involves the participation of local schools, school districts and the various state agencies. All are interested in ensuring that students receive the best possible instruction, and each level has certain responsibilities to the student.

For instance, local schools are responsible for, among other things, directly providing instruction in the classroom. The schools' challenges and goals have always been unique when compared to those of the state-level agencies. Although school goals usually are aligned with state goals, school-level goals are unique and must be recognized.

One of the goals of all levels of education within Kentucky is to ensure that each level has input into the decision-making process. This is necessary in order for informed and optimal decisions to be made. It is extremely difficult to make the best educational decisions for the children of Kentucky unless a well thought-out governance structure is in place.

The governance initiative will involve a review of many items including:

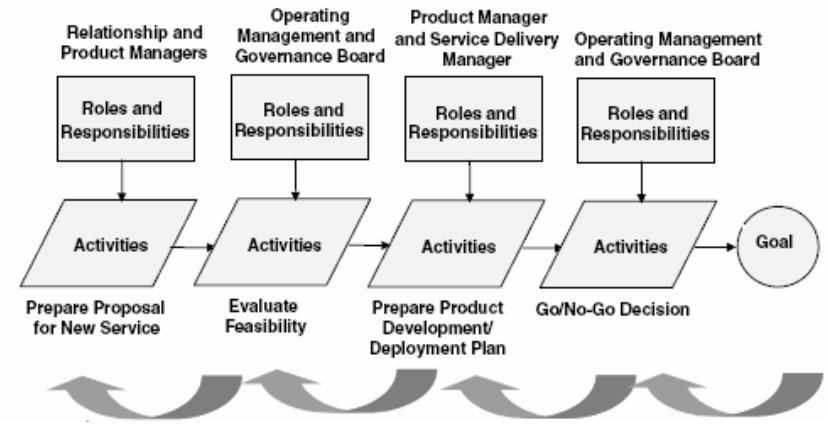
- The best method for schools and districts to effectively voice the educational goals and challenges that are important to them
- The most appropriate people to be directly involved in the decision-making process
- The people or groups of people who are responsible for making certain decisions
- The ideal process by which decisions are made and communicated to all those who are involved

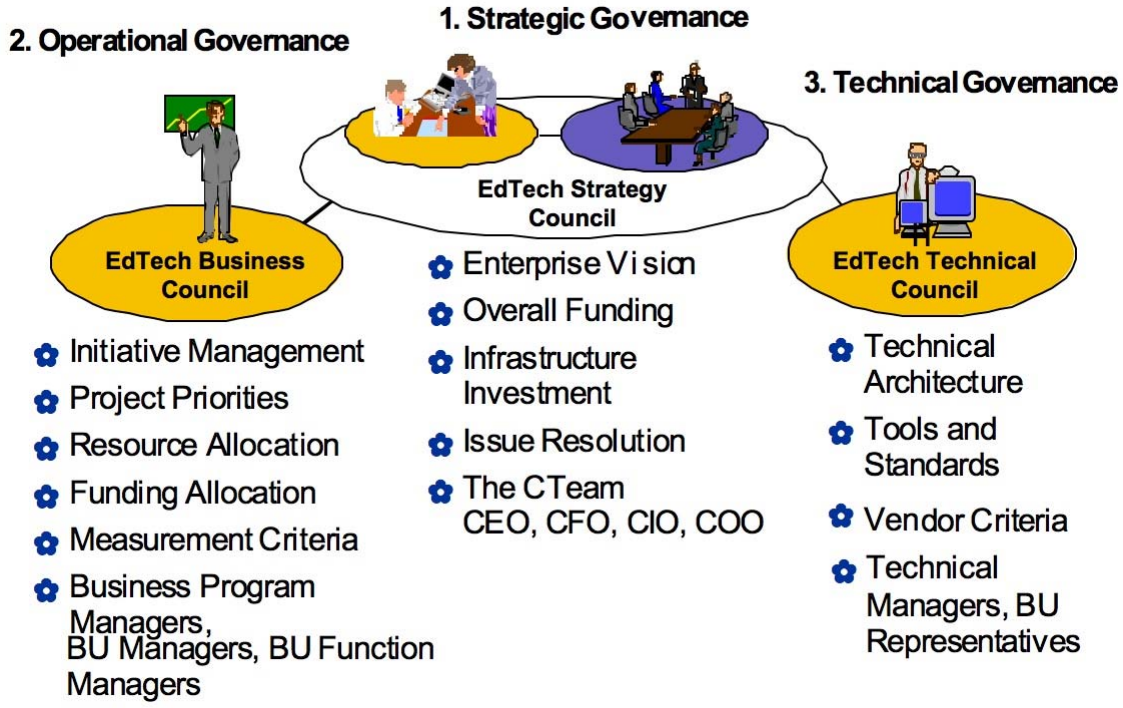
Ultimately, the goal of proper governance in educational technology is to ensure that those who are affected by decisions have a chance to contribute their input, understand who will be making the decisions and have visibility into the way that decisions are made.

This will result in better decisions being made that will ultimately help students in the state excel. That is how this initiative fits with the common goals of education providers in Kentucky.

Governance Process to Goals

Figure 1. Governance Process to Goals





Organizational Structure Evaluation

The goal of this initiative is to better organize the schools, districts and state agencies so that educational technology can be provided to the students in the best way.

At this time, there are many educational technology providers who create, deliver and support educational technology, and this can often confuse people in the schools and districts. People need to know whom to ask when they have a question or problem, and different groups who help with educational technology do not always understand what the other groups are doing.

There are different types of educational technology organization types. This initiative is to meant to analyze the different organizational models to understand the best structure with which to move forward.

Although organizational structure can either help or harm the way schools and districts use educational technology, it is not the only factor to consider. There is no one right structure. What is important is understanding what the schools, districts and state agencies really need.

For example, all education technology organizations serve similar purposes and have similar accountabilities, but their personality profiles, management systems, processes, constraints, strengths and weaknesses make each education technology organization unique. There are, however, certain best practices and attributes for ensuring an optimized education technology organizational structure, which derive from evolving business paradigms.

Technology Organizational Structures

Enterprise organizational model	Advantages	Disadvantages
Centralized 	**All IS reports to corporate CIO, including any IS units colocated in business units; all IT spending controlled by CIO**	
	• Economies of scale, efficiency • IT cost visibility and control • Easier development/integration of enterprise applications	• Traditionally less flexible • Isolated from the business • Less responsive to local needs
Decentralized 	**Each business unit manages own IS unit(s) and IT spending, operating independently of other business units**	
	• Responsive to local needs • Business awareness • Rapid development	• High cost due to duplication • Difficult to share data or expertise • Architectural diffusion
Federated 	**Corporate (or global) CIO is responsible for own IS unit, as well as coordinating division IS units, as shown by the dotted lines**	
	• Combines benefits of both centralized and decentralized • Balances central and local needs	• Less efficient due to duplication, coordination overhead • Requires strong governance

= Business unit = IS unit

With Increased Complexity, Governance Is Even More Critical

Decision domain / Style	IT Principles		IT Infrastructure Strategies		IT Architecture		Business Application Needs		IT Investment and Prioritization	
	Input	Decision	Input	Decision	Input	Decision	Input	Decision	Input	Decision
Business Monarchy										Cap. appr. com.
IT Monarchy				CIO IT leadership		CIO IT leadership				
Feudal										
Federal	Exec. com. Bus. leaders		Exec. com. Bus. leaders		Some exec. + some bus. leaders Bus. pro. own.				Exec com. Bus. leaders	
Duopoly		Exec. com. IT leadership					Bus. leaders Bus. pro. own Bus./IT rel. mgs.	Bus. leaders IT Leadership		
Anarchy										

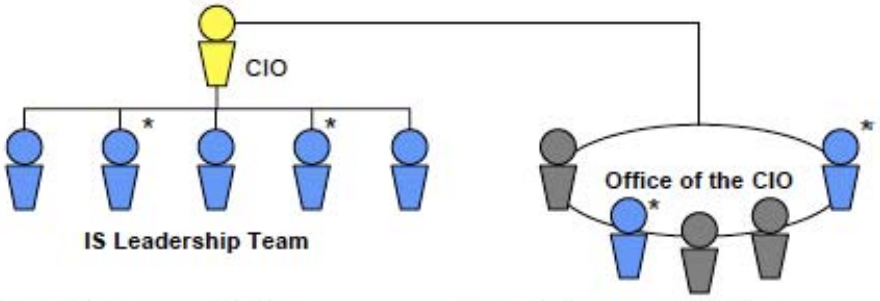
Governance Mechanisms — Input rights — Decision rights

▪Exec. comm.	▪Executive committee	▪Cap. appr. com.	▪Exec com. subgroup, includes CIO
▪Bus. leaders	▪Business unit heads/presidents	▪Bus. pro. own.	▪Business process owners
▪IT leadership	▪CIO, CIO's office and bus. unit CIOs	▪Bus./IT rel. mgs.	▪Business/IT relationship managers

Governance reduces complexity in many important ways:

- it clarifies who has input and decision rights in any given decision
- it reduces the importance of politics in decision making, and increases the importance of clearly defined and weighted criteria
- it provides a forum for open debate of priorities and initiatives
- it increases the weight of final decisions making it easier to deal with dissenters

CIOs Are Using Their Office To Increase Attention And Focus On Major Issues



▪Sample responsibilities:
- Execute the IT strategic plan
- Deliver IT services and business results
- Manage to the budget
- Manage personnel
- Resolve operational issues
- Lead their teams

▪Sample responsibilities:
- Represent and support the CIO
- Coordinate across IT organization and the enterprise
- Set IT policies, standards and architecture
- Manage relationships with the business, finance and HR.
- Facilitate setting the IT direction and strategy

*CIO direct reports who are also members of the office of the CIO.

Gartner

Enterprise Architecture Foundation

Enterprise architecture is a term that is used to describe how educational technology will be designed in order to support the educational goals within the state. Educational technology is made up of many different parts.

Examples of these parts are:

- **software** (programs that the children use to help them learn)
- **hardware** (the devices that the students and teachers use)
- **operations** (educational reporting that the state must do to obtain grants)
- **projects** (rolling out new versions of software and training staff how to use new computers)

These parts must fit together properly in order to be useful. For instance, certain student software applications, like the multi-media packages that students enjoy, run better on certain types of computers. Those computers/devices can be connected to the Internet and to other more powerful computers, but a certain type of connection is required. An enterprise architecture looks at all of these parts so that if a certain computer application is needed, the proper hardware will be purchased so that the students will get the maximum benefit from the purchase.

Essentially, a strong enterprise architecture helps to answer basic questions like: "What are the schools, districts and state agencies' educational goals and processes? How is educational technology supporting those educational goals?"

This initiative involves a formal plan for designing an enterprise architecture, which includes:

- Educational needs -- how can teachers and principals best instruct children in the schools?
- Information needs -- what information do principals and teachers need to help them teach their students? How should they track attendance, grades and lunch programs?
- Technology needs -- how many computers are necessary, and how can they be used to provide students with access to educational information, videos and course materials?

More specifically, this initiative involves:

- Understanding the schools' and districts' needs.
- Deciding which types of computers and servers are most appropriate
- Designing the computer/server layout so that it meets the schools' and districts' needs in a cost-effective way
- Making sure that when older technology is no longer ideal, it is replaced
- Having the state research and develop computer standards so that schools and districts will have guidance when wanting to buy new computer equipment

Proper enterprise architecture will guide the educational technology organization in building computers, servers and teaching systems optimally, so that the teachers, principals and others have everything they need to enhance the way they teach children.

Proper enterprise architecture also will allow the state to provide educational technology at the lowest cost.

The best way to begin an exercise like this is to perform an assessment of how the existing enterprise architecture is designed and what works and does not work well. That will be the initial step in this process. This is referred to as a Maturity Audit.

Districts and state agencies that are successful with enterprise architecture are able to overcome cultural, organizational and political problems. They are able to achieve broad agreement on how educational technology can help support the overall educational goals of the state.

Communications Planning

The goal of the initiative is to improve upon and maintain positive relationships by understanding what is important to people, what they believe is not working today and what the state as a whole should try to achieve over the next few years.

The keys to success will be:

- School, district and state educational technology provider leadership constantly analyze concerns, priorities and communication needs of the students, teachers, principals and others within the state.
  - Students, teachers, principals and others know the appropriate person to contact if they have a question or would like to provide some type of input on how to improve some aspect of education technology
  - Students, teachers, principals and others understand what information they need to communicate
  - Students, teachers, principals and others understand when someone will respond to their request or statement
- School, district and state educational technology providers spend time understanding the culture within the education organization in Kentucky and factor in what types of communication patterns will and will not be acceptable to students, teachers, principals and others.
- School, district and state educational technology providers create a common look and feel to communication, including the format of the message content, the way the communication is presented and a communication calendar.
- School, district and state educational technology providers have a clear process to follow that outlines how information will be shared.
- School, district and state educational technology providers are up to date on the different ways in which information can be shared. Examples include face-to-face, telephone, e-mail and Tele/video/Web conferences. It will be important to match the media with the message.

Data Warehouse and Business Intelligence

The overall big picture concepts described below in regards to data warehouses and education business intelligence relate to all initiatives and projects that are listed as Data Systems on the charts in Chapter 4 of the Master Plan.

KDE always must focus on the differences between the districts across the state, yet not lose its speed of important decision-making for the individual student, teacher, school and district. The large volume and complexity of data is a problem for managers. It is difficult to analyze the data when there is so much of it.

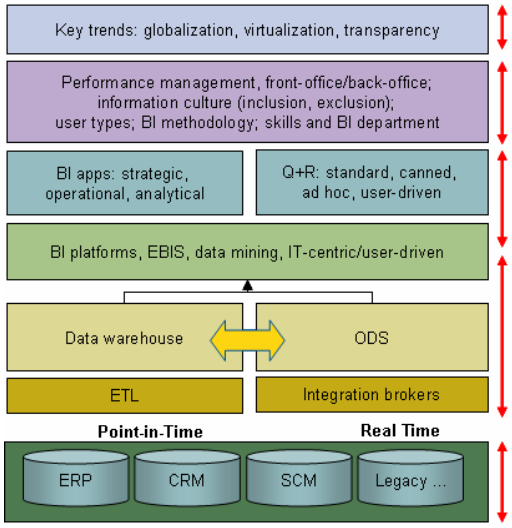
Managers need a tool that will help them see summary data or enable them to quickly look at different areas of data to help them recognize a problem or an opportunity. For instance, if a student is not doing well in class, it would be useful if a teacher or principal could quickly and easily look to see how that student performed in prior years, if that student came from a different district or state or if that student's transportation to school was lengthy. All of this data could help the educators understand what might be contributing to that student's performance.

Business intelligence applies to many other areas. For instance, the state does a great deal of reporting to federal agencies so that it can secure additional grant funding. Business intelligence can be very useful to those who need to provide data to external groups quickly and accurately, in order to provide additional funding to the schools and districts.

Critical success factors include:

- established and effective:
  - governance
  - enterprise architecture
  - a business intelligence competency center
  - gradual project-based approach rather than attempting to implement everything immediately (higher risk of failure)
- integration considerations (how the various systems 'talk' to each other)
- tool selection decisions
- data management considerations (standards, quality, ownership)

Flow of Business Intelligence



Appendix E:

Governance, Statutory Authority and Policy

Statutory Authority and Responsibility

The Master Plan for Education Technology

KRS 156.666 establishes the Council for Education Technology as an advisory group to the Kentucky Board of Education. The council was responsible for developing the Master Plan for Education Technology.

Approval and Update of the Master Plan
The Kentucky Board of Education and the Legislative Research Commission shared initial approval authority for the Master Plan pursuant to KRS 156.670(1).

KRS 156.670(7) places responsibility for updating the plan, as necessary, with the council and the board. Updates are to be reported to the Legislative Research Commission.

Standards
KRS 156.160(1) stipulates that the Kentucky Board of Education has a statutory mandate to prescribe standards, which school districts shall meet. Among these are standards for the "acquisition and use of educational equipment for the schools as recommended by the Council for Education Technology" (KRS 156.160(1)(b).
KRS 156.670(3) states that the Master Plan shall "establish and implement a uniform and integrated system of standards and guidelines for financial accounting and reporting which shall be used by all school districts."
KRS 156.670(4) requires that the education technology system provide “comprehensive, current, accurate, and accessible information relating to management, finance, operations, instruction, and pupil programs which are under the jurisdiction of the Department of Education.” The chief state school officer must certify these data to support administration of the Support Education Excellence in Kentucky (SEEK) fund, which provides funding to support the public school system in accordance with KRS 157.330. The guaranteed base funding level for each district is computed based on the prior year's average daily attendance (KRS 157.360(1)), which is calculated based on data collected within the school and accumulated at the district level. To support this funding process, the Kentucky Board of Education has the obligation and authority to establish standards for administrative systems at the district and school level, including, but not limited to, uniform codes, processes and software systems.

The statutes do not restrict the standards-setting responsibilities noted above to any particular source of funds. The Kentucky Board of Education, therefore, has the authority and obligation to specify standards for education technology to which school district acquisitions of hardware and software are subject regardless of source of funds. The board may specify, as it deems necessary, a standard for any line item in the Master Plan budget.

These standards are set forth in the Master Plan for Education Technology and incorporated by reference into Kentucky Administrative Regulations (KARs) pursuant to 701 KAR 5:110 and in compliance with KRS 156.160(1).

Districts are required by 701 KAR 5:110 to procure only those technologies that meet KETS standards, if a standard for that category has been established, regardless of source of funds.

Education Technology Trust Fund

The Education Technology Trust Fund is established in the Finance and Administration Cabinet by KRS 157.665(1) to provide education technology for the public school system.

Funds are appropriated to the trust fund in each biennial budget. All interest earned on money in the fund is retained for reinvestment in the fund. All money credited to the fund, including interest, is to be used for education technology as defined by the Kentucky Board of Education's Master Plan and does not lapse (KRS 157.665(2)).

The School Facilities Construction Commission, within the Finance and Administration Cabinet, is responsible for distributing state funds to local districts through the education technology-funding program (KRS 157.650).

To participate in the education technology funding program, a local public school district must have an unmet technology need described in the district plan and approved by the Kentucky Board of Education (KRS 157.655(1)).

The base level of assistance to each district is determined by dividing the total amount available in the trust fund by the total of the prior year's average daily attendance of the eligible districts times the individual district's prior year's average daily attendance (KRS 157.660(1)).

Funds transferred to districts are to be used only for the projects included in the district’s plan (KRS 157.660(2)).

Trust funds are transferred to local districts after the district's need for assistance has been certified by the School Facilities Construction Commission. All other expenditures from the fund require the approval of the Kentucky Board of Education (KRS 157.655(3)).

Calculation of Unmet Need

Any technology procured or secured by a district, in a category for which a KETS unmet need standard is established, regardless of whether the item is used to reduce the unmet need or not, must meet or exceed the KETS standard in compliance with 701 KAR 5:110.

Any technology procured or secured by a district, in a category for which a KETS unmet need standard is established, regardless of whether the item is used to reduce the unmet need or not, must be included in the District Plan as inventory.

Approval of the unmet need amounts for local school districts is the first step required to allow local school districts to receive state funding to assist them in funding hardware, software, personnel, professional development and other technology initiatives that will support students in achieving academic excellence and reaching proficiency by 2014.

Staff certify that the districts recommended by the Commissioner of Education have met all the statutory requirements of KRS 157.655 and KRS 157.660 and will be required to

adequately describe their unmet need and current KETS inventory before Offers of Assistance are distributed.

The following must occur before a district receives it's funding:

1. Kentucky Board of Education approves unmet need for districts.
2. School Facilities Construction Commission (SFCC) approves unmet need.
3. The district successfully meets all of the statutory requirements of KRS 157.655 and KRS 157.660.
4. The district verifies its final ADA count to KDE's Division of School Finance.
5. KETS staff calculates Offers of Assistance based on these variables.

The districts must follow requirements of the SFCC by receiving approved board action and proof of deposit of funds into a local interest bearing technology account. The SFCC will then wire funds to the district's technology account.

There are four categories of unmet need: operations; maintenance; incremental replacement; and new technologies.

Expenditures in **operations and maintenance** are absolutely necessary to sustain current levels of service. If unmet need within the operations and maintenance categories is not addressed in accordance with program guidelines, the integrity, sufficiency and capacity of the district technology infrastructure will degrade until services are seriously curtailed or eliminated. These include items such as student workstation repair, teacher workstation repair, instructional software improvements, classroom printer repair, instructional fileserver repair, school management software improvements, initial/ongoing technology integration, professional development, student technology leadership services, Internet services, telephone communications to parents, distance learning service, help desk services, e-mail services, enterprise data system access and school financial management services.

The unmet need for **incremental replacement** constitutes a framework for replacement of various technology components on a scheduled basis over time, in accordance with the life cycle of each item or service. These include items such as student workstations, teacher workstations, instructional fileservers, assistive and adaptive technology, school laser printers, classroom color printers, wireless networks, student hand-held devices, high-speed fiber networks, desktop conferencing and digital projection devices.

The unmet need for **new technologies** includes products and services that are more discretionary in nature, products and services that are today only marginally available or affordable and products and services that are perceived as needs in the planning horizon.

The Kentucky Board of Education will acknowledge and approve the unmet need for each district. In the KETS Implementation Plan, the board also will be considering approval of the amount of funds available to go toward that unmet need. Districts must continue to secure alternative funding sources beyond the KETS funds, using federal funds, local grants or other sources, to fully fund the unmet need. Budgeting skills will be required to sustain and implement Phase III of KETS.

Product Standards

Our approach is an enterprise design in which all districts are working toward common objectives. When all districts use product standards, all of the state's school districts maximize the taxpayer dollars by ensuring the highest possible levels of interoperability and a consistent look on any workstation across the state. Standards also minimize the retraining required when staff move between schools or districts and lessen the annual support required after implementation. The purchasing power of the state is maximized by leveraging the weight of the entire organization to buy a product standard. The Gartner Group noted that Kentucky was saving millions with the architectural standards approach. Kentucky was recently awarded a $6 million grant based on the fact that we had state product standards for our school, student and financial management systems.

Components for Which Standards are being established

- student, teacher and administrator workstations
- instructional and administrative printers
- instructional and administrative fileservers
- network components: routers, network concentrators, network interface units, network interface cards, network computing services, CSU/DSUs, network switches, Telco data lines, Telco voice lines
- building wiring (incorporates EIA/TIA standards): work area wiring, horizontal wiring subsystem, building backbone subsystem, campus backbone subsystem, power wiring, installation standards
- remote communications: VPN
- software: network operating systems, operating systems, relational database systems, office products (word processing, spreadsheet, calendar, graphics, end-user database), electronic mail, Internet browser, remote access software, proxy software, network management software, desktop management software
- Instructional software: KETS does not establish specific standards for instructional software. KETS has developed guidelines in the form of a checklist for educators to use during software selection. Instructional software must run, however, on KETS-standard hardware in a KETS-standard network environment. To secure discounted pricing, KETS does issue competitive solicitations and establish price contracts for the most popular instructional software products.
- applications: district financial management and administrative management, school student management, district-level accumulator, online instructional software review service
- television monitors
- Help Desk services
- maintenance services
- multimedia applications and services: projectors, whiteboards
- distance learning: Kentucky Virtual High School (KVHS), Kentucky Telelinking Network (KTLN), Kentucky Virtual Library (KVL), Kentucky Education Television (KET), Kentucky Virtual University (KVU)
- proficiency training
- assistive and adaptive technology
- enterprise database
- instructional and administrative technology integration leadership
- STLP
- telephone systems

Technology Standards

Technology Standards represent a uniform set of specifications and guidelines which are leveraged to insure system interoperability and reduce operational complexity, therefore reducing the overall Total Cost of Ownership.

"The Commonwealth is committed to the guiding principle of viewing technology investments from an enterprise perspective. The Enterprise Architecture and subsequent standards represent the overall plan and a living process for designing and implementing information technology solutions to serve both instructional and business functions.

An information technology architecture and related set of standards are vital to ensure the compatibility of the current IT projects and other future IT initiatives. The Enterprise Standards are important for defining the rules by which technology is envisioned, implemented, and managed."

Since 1992, Enterprise Standards have anchored all instructional, administrative, and technical aspects of Education Technology. These standards have afforded the Commonwealth a) significant savings in the initial procurement of technology equipment, b) equitable supportability regardless of geographic location, c) a foundational infrastructure to provide for secure, global ease of access, d) statewide collaboration via various forms of electronic mediums (email, telephonic, video-conferencing), e) statewide adoption of the Internet as an instructional resource, and f) uniform business applications to address both student management and financial management. All Commonwealth of Kentucky Public School districts share in the benefit of each of these efficiencies due to a common set of technology standards.

Standards Community

A standards organization, also referred to as standards development organization or SDO, is any entity whose primary activities are developing, coordinating, promulgating, revising, amending, reissuing, interpreting, or otherwise maintaining standards that address the interests of a wide base of users outside the standards development organization.

KETS Standards are derived and/or subsequently adopted with either input from, or as a directive of a variety of these entities:

- **Industry Standards Organizations** such as ANSI, IEEE, IETF, SANS, ISC2.
- **Legislative Organizations** such as the Kentucky General Assembly, and the Kentucky Board of Education.
- **Educational Organizations** such as ISTE, SREB, CCSO, and NECC.
- **State Organizations** such as the Commonwealth Office of Technology (COT), and Kentucky Department of Education (KDE).
- **Research Organizations** such as Gartner.
- **Product Development Organizations** such as Microsoft, Dell, Nortel, and various vendor consortiums such as SIF.

Statutory Authority and Responsibility

The Master Plan for Education Technology

KRS 156.666 establishes the Council for Education Technology as an advisory group to the Kentucky Board of Education. The Council was responsible for developing the Master Plan for Education Technology.

Approval and Update of the Master Plan

The Kentucky Board of Education and the Legislative Research Commission shared initial approval authority for the Master Plan pursuant to KRS 156.670(1).

KRS 156.670(7) places responsibility for updating the plan, as necessary, with the Council and the Board. Updates are to be reported to the Legislative Research Commission.

Standards

KRS 156.160(1) stipulates that the Kentucky Board of Education has a statutory mandate to prescribe standards, which school districts shall meet. Among these are standards for the "acquisition and use of educational equipment for the schools as recommended by the Council for Education Technology," (KRS 156.160(1)(b).

KRS 156.670(3) states that the Master Plan shall "establish and implement a uniform and integrated system of standards and guidelines for financial accounting and reporting which shall be used by all school districts."

KRS 156.670(4) requires that the education technology system provide 'comprehensive, current, accurate, and accessible information relating to management, finance, operations, instruction, and pupil programs which are under the jurisdiction of the Department of Education.' The Chief State School Officer must certify these data to support administration of the Fund to Support Education Excellence, which provides funding to support the public school system in accordance with KRS 157.330. The guaranteed base funding level for each district is computed based on the prior year's average daily attendance (KRS 157.360(1)) which is calculated based on data collected within the school and accumulated at the district level. To support this funding process, the Kentucky Board of Education has the obligation and authority to establish standards for administrative systems at the district and school level, including, but not limited to, uniform codes, processes, and software systems.

The statutes do not restrict the standards-setting responsibilities noted above to any particular source(s) of funds. The Kentucky Board of Education, therefore, has the authority and obligation to specify standards for education technology to which school district acquisitions of hardware and software are subject regardless of source of funds. The Board therefore may specify, as it deems necessary, a standard for any line item in the Master Plan budget.

These standards are set forth in the Master Plan for Education Technology and incorporated by reference into the Kentucky Administrative Regulations pursuant to 701 KAR 5:110 and in compliance with KRS 156.160(1).

Districts are required by Kentucky Administrative Regulation 701 KAR 5:110 to procure only those technologies which meet KETS standards, if a standard for that category has been established, regardless of source of funds.

Enterprise Architecture, Policy, Products, and Standards

Enterprise Architecture and Standards covers the broad spectrum of technology environments to include software, hardware, networks, applications, data, security, access, communications, project management and other relevant architecture disciplines. These technology areas are described in domains, and each domain contains enterprise policies, standards, and products to support the vision. Additionally, specific technology components (hardware or software) which have been deemed by either the Kentucky Department of Education or Commonwealth Office of Technology as an enterprise component and subsequently made available via a Statewide Procurement vehicle (State or KETS Contract) are considered KETS and/or State Product Standards.

These product standards are listed within the respective Enterprise Standards Domains:

Enterprise Standard Domains

1. **Infrastructure**
   - **Network**

     LAN, WAN, Wireless, Protocols, Components, Computing Services, Switches/Hubs, Modems, Installation Standards
   - **Security Systems**

     Information Security Management, Architecture and Models, Access Control Systems and Methodology, Applications and Systems Development, Operations Security, Cryptography, Physical Security, Telecommunications, network and Internet Security, Business Continuity Planning, Law, Investigation and Ethics
   - **Hardware**

     Desktop Computers (PC, MAC), Servers, Printers, Tablets, Fileservers
   - **Software**

     Operating Systems, Office Suite, Database Management Systems, Email, Proxy, Internet Browser, Remote Access, Anti Virus, Multimedia
2. **Data** - common data elements, data definitions, naming conventions, geographic information system (GIS) data standards
   - **Administration**
   - **Management**
   - **Metadata**
3. **Operations Environment**
   - **Support Management**

     Helpdesk
   - **Operations Management**

     Performance Monitoring, Backup, etc.
   - **Web Management**
   - **Systems Management**

     Tools for management and control of servers, networks and IT infrastructure

4. **Communications**
    - **Internet**
    - **Telephony**

        Email, Voicemail, Interactive Voice Response (IVR)
5. **Project Management -** Discipline of defining and achieving targets while allocating use of resources (time, money, people, materials, energy, space, etc.) over the course of a project.
    - **Tools and Method**

All KETS and State Enterprise Architecture, Policies, Products, and Standards can be located at the following URLs:

KETS Standards - http://www.education.ky.gov/KDE/Administrative+Resources/Technology/Technology+Architectural+Policies+and+Standards/default.htm

State Standards - http://cot.ky.gov/policies/

Unmet Need Standards and Policies

Unmet Need Standards represent the equitable baseline of all technology components required to adequately address both the instructional and administrative needs of K12. These standards are derived from two separate by complimentary criteria:

- **Component Ratios** (Quantities) – Baseline minimum ratios for each technology component have been established based on average daily attendance, total number of schools, total number of teachers, or total number of classrooms. It is the expectation that all districts maintain these minimum ratios to effectively address equitable ease of access for all instructional and administrative activities.
- **Component Standards** (Products) – All published architectural standards and associated products are considered KETS Standard Components.

Any technology procured or secured by a district, in a category for which a Kentucky Education Technology System unmet need standard is established, regardless of whether the item is used to reduce the unmet need or not, must meet or exceed the KETS standard in compliance with 701 KAR 5:110.

Any technology procured or secured by a district, in a category for which a Kentucky Education Technology System unmet need standard is established, regardless of whether the item is used to reduce the unmet need or not, must be included in the District Technology Plan as inventory.

Technology secured through local initiative which is not procured with public revenues will not be used to reduce the unmet need of the district for the purpose of calculating the amount of offers of assistance for which the district is eligible.

Technology procured with federal categorical funds will not be used to reduce the unmet need of the district for the purpose of calculating the amount of offers of assistance for which the district is eligible.

Architectural Standards Committee

The KETS Architectural Standards Committee (KASC) has been formed to participate in the overall governance aspects of Architectural Standards adoption and/or modification. This committee is comprised of both local school district and KDE representatives, and is charted to provide guidance, input, and recommendations into the overall process of standards adoption.

The KASC meets on a bi-monthly basis and submits its recommendations to the Office of Education Technology. Once the request is accepted members at times where appropriate may work very closely on various action teams to provide the content for the recommended standards that will be generated.

For more information visit:
http://www.education.ky.gov/KDE/Administrative+Resources/Technology/Technology+Architectural+Policies+and+Standards/Architectural+Standards+Committee.htm

Appendix F:

Education Technology Master Plan Budget

Budget: Summary and Funding

The Master Plan Budget outlines essential operational, support, and maintenance costs required to maintain KETS core network and day-to-day services over the next six years. Many of the budget line items remain very similar to those in the past, but the costs associated with these items have been adjusted to reflect the anticipated costs for the future. The Budget also includes education initiative costs that will foster higher levels of educational technology service delivery, some of these initiatives are deemed non-discretionary (mandatory) and others discretionary (optional). This summary describes the budget components and highlights the changes since the last budget including a designation of which items are non-discretionary and which items are discretionary. The Budget will also provide guidance for districts to do education technology planning.

Changes from Previous Versions of the Budget

WAN Components

Wide Area Network (WAN) components and reoccurring charges have been modified to address anticipated connectivity relating to the upcoming Kentucky Education Network (KEN) implementation.

Non-Discretionary Items

Non-Discretionary items, those that are required/mandatory expenditures, fall into three categories: Operational, Support and Maintenance, and Non-Discretionary Initiatives.

Operational

Operational items include hardware, network, and software for schools, districts and state. These items are listed in the left-hand column of the budget. All operational items have a recommended refresh rate. In order for items to perform as needed and desired, the refresh rate must be considered for budgeting purposes. Items not replaced timely incur greater support and maintenance costs.

Support and Maintenance

Support and Maintenance takes into account the people (labor) required to support and maintain the operational items, the cost of software and operating system updates, and additional hardware warranty and repair costs.

Non-Discretionary Initiatives

Non-Discretionary Initiatives are those projects/programs that have been deemed mandatory for the purpose of maintaining current education technology. Such initiatives include: Workstations, Internet II, E-mail and Content Management, Next Generation Virtual High School, Large Scale Summative Testing, Document and Content Management, Next Generation School Information System (SIS), Individual Learning Plan (ILP), Kentucky Instructional Data System (KIDS), Knowledge Management Portal, Reading First/Read to Achieve, Kentucky Education Network (KEN), Microsoft ISA 2006, Backup and Security & Authentication.

Discretionary

Discretionary items are those that are optional for districts and schools to move forward with when funding sources are available. Discretionary items fall into two categories: Discretionary Education Initiatives and Above and Beyond.

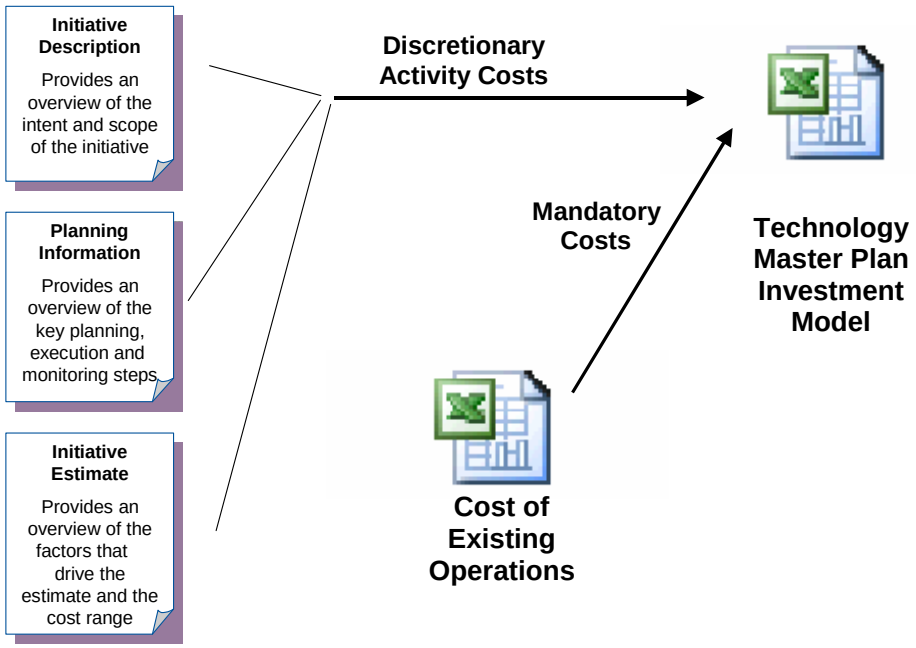
Discretionary Education Initiatives

Discretionary Education Initiatives are projects/programs that support instructional teaching and learning, but are not required. Such initiatives include: Large Scale Formative Testing, Consolidated Program Monitoring, School Facilities, Hardware/Software Consolidation, Storage Planning, Portal, Differentiated Service Delivery, Performance –Based Service Delivery, and Project Portfolio Management.

Enhanced Functionality

Items that fall into the Above and Beyond category include those things that schools and districts want to do which provide students, teachers, administrators and staff with greater capabilities than base-lined in the Master Plan. Such items could include lower workstation ratios; video conferencing; wireless; smart/interactive classroom, which includes components such as the interactive whiteboards, projectors, and student response systems.

KETS Budget



Funding

Funding for KETS unmet need primarily comes from:

- Federal Funds
  - No Child Left Behind (NCLB), Enhancing Education Through Technology (EETT)
  - E-rate
  - New Market Tax Credit

- State Facility Construction Funds
- State Bonds
- KETS Offers of Assistance

Schools and districts will need to supplement state technology funding from other sources:

- Professional Development Funds (can be used for teacher technology training)
- Textbook Funds (can be used to acquire instructional software)
- Special Education Funds
- SEEK Funds
- Corporate Donations
- Local Tax Funds (not technology specific)
- Local Fund Raisers
- State Coal Severance Funds available to eligible districts