Boone County Planning Commission GIS Strategic Plan

May 2008

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BOONE COUNTY GIS STRATEGIC PLAN
MAY 2008

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EXECUTIVE SUMMARY

Boone County GIS Strategic Plan

A.   **History**

In 1993, a GIS Implementation Plan was developed by GRW at the request of the Boone County Planning Commission, the Boone County Fiscal Court, the City of Florence, the Boone County PVA and the Florence Water and Sewer Commission. The Implementation Plan represented an assessment of different agencies and their level of interest in participating in a county-wide GIS program. The Implementation Plan also outlined a series of recommendations to begin a county-wide program. Since it has been almost 15 years, it was felt that a Strategic Plan should be formulated to determine future work activities based upon staffing and technological needs, as well as the needs of 44 different entities who use Boone County GIS on a daily basis.

B.   **Today**

Boone County GIS was formed as a partnership in 1995 by the Boone County Planning Commission, the Boone County Fiscal Court and the Cities of Florence, Union and Walton. The Planning Commission is the managing partner of Boone County GIS. Not only are there 5 partners, but also 20 contributing members, 6 data subscribers, 8 data sharing affiliates and 5 non-contributing members (see attached list). The different categories are further described on pages 4-5 of the Strategic Plan.

C.   **Purpose of Strategic Plan**

This Strategic Plan serves many purposes. First, it is a business plan that guides GIS activities pursued by the GIS staff. Second, the plan outlines strategies that serve to position Boone County's GIS to meet future technological, organizational, operational and financial needs. The plan has a 5-year time horizon or a planning time frame from 2008-2012. It is the intent of this Strategic Plan to be revisited and possibly revised at least once every five years to reflect shifting priorities and changes in technology.

D.   **Mission and Core Values of Boone County GIS**

The overall mission of Boone County GIS is to improve service to Boone County residents and businesses by providing mapping capabilities, geospatial technology and geographic analysis services to local government agencies. Central to this mission are values that can be viewed as guiding principles of the GIS program. These values represent service, professionalism, accountability, empowerment, integration, knowledge, cutting edge results.

E. Vision for Boone County GIS

A vision of what Boone County GIS is striving for with its GIS Program is one in which geospatial data and technologies are a vital part of every public agency in Boone County and in Northern Kentucky. The following sections offer more of the vision for specific aspects of the GIS program.

- *Technology* - Any future vision of Boone County's GIS must include a commitment to deploying new ESRI software and technology. This has been the case in the past to avoid catching up.

- *Systems Integration* - Because of the diversity of Boone County GIS users, flexibility to interact with other information services is an absolute necessity.

- *Program Scope* - It is essential that the partnership remain focused on serving public sector agencies, coordinate with other regional and statewide GIS activities.

- *Consortium Membership* - There are currently very few public sector entities in Boone County that don't participate. Additional efforts will be made to recruit these members.

- *User Base and Agency Staffing* - The partnership expects the number of GIS users to grow. An orientation program should be established to train new users and to advance higher end GIS projects.

- *GIS Services Division Staffing* - As the total number of users grow (698 as of December, 2007), expectations of the staff will increase and usually result in an increased workload. This may result in the need of hiring additional staff.

F. Situational Assessment

A detailed Situational Assessment (Strengths, Weaknesses, Challenges and Opportunities) was performed in the following categories: User Base, Technical Infrastructure, Custom Application Development, Website, Geodatabase Implementation and Data Management, Cartography, Systems Integration, Staffing, ArcGIS Desktop, Strategic Partnership, Accountability, Financial Security, Recognition/Public Relations and Advisory Board. Below is a summarized version of the assessment.

1) User Base
    Strength - close to 700 users and 44 entities use the data.
    Weakness - increase in staffing demands and continue local upgrades.
    Challenge - balance needs of all users and workload.
    Opportunity - other regional agencies and utilities are possible and web applications.

2) Technical Infrastructure
    Strength - 3 servers, ESRI products, GIS deployment and networking services offered by the county.

Weakness - Not all agencies have updated hardware to meet high power software needs. Some heavy users have different computer platforms making compatibility difficult.

Challenge - Set standards that are a requirement versus a suggestion. Assure future software. Connect remote sites.

Opportunity - GIS service delivery over the Internet and establishment of a Virtual Reference System (VRS) or a network of GPS base stations.

3) <u>Custom Application Development</u>

Strength - Development of a custom application - Boone Map and the ArcMap extension of Boone Map workstation. In addition, a custom ArcPad GPS application was created by staff.

Weakness - Boone Map Classic is considered old technology. Two versions of Boone Map is difficult to support by staff. No one on the existing staff is considered to be a computer programmer. There are also limitations on editing scripts by ESRI.

Challenge - Keeping up with the increasing number of locally installed applications.

Opportunity - Elimination of Boone Map Classic would free up staff time. Creation of ArcMap power users. Full use of ArcGIS server as it is designed to support advanced GIS functions via a web browser application interface.

4) <u>Web Site</u>

Strength - Deployment of 18 ArcIMS sites and 5 ArcGIS web mapping services sites is consistent with advanced technology.

Weakness - ArcIMS does not have advanced functionability, such as spatial queries.

Challenge - As some point, ArcIMS may be replaced by ArcGIS Server. This will involve more training for ArcGIS Server users.

Opportunity - Continue to integrate web mapping services with member agencies websites. Add project summaries to website.

5) <u>Geodatabase Implementation and Data Management</u>

Strength - Use of standardized layer files to enhance the published data. Development of a single enterprise database.

Weakness - A formal strategy should be developed to protect sensitive data, to serve as a backup and archiving protocol and to restore/recovery procedures from such archives.

Challenge - Geodatabase needs to stay flexible and conforms to state and federal standards. Lack of familiarity of data security measures with SQL Server 2005. Distribute custodianship of data layer maintenance.

Opportunity - Use of ArcSDE geodatabase would be increased if the potential for ArcGIS Server web mapping services could be achieved. Research true backup and recovery practices to employees. By distributing custodianship of data maintenance, it allows staff to work on more critical applications and new technology.

6) <u>Cartography</u>
   Strength - Map making has been a success with the public - points of interest maps, standardized mapping templates, specialty maps.
   Weakness - No standardization mapping templates for individual agencies. Yet to change programming code to improve editing functionality.
   Challenge - Lack of training in application programming will make it difficult to update Boone Map LT to leverage the additional editing functionality found in ArcReader 9.2.
   Opportunity - Increased editing functionality will produce higher quality maps and speciality maps may be of high demand from the public.

7) <u>Systems Integration</u>
   Strength - GIS has been successfully integrated with the CMMS system used by Florence. Also, mapping of crime data has occurred using ILEAD/CAD.
   Weakness - Different domain tables are used by the City of Florence and Sanitation District No. 1. Crime mapping was a one-time compilation and ILEADs/CAD system is intergraph based. In addition, CAMA integration is now underway. STI routing still remains an issue with the School District. Third party GIS solutions is often looked at as being difficult for integration.
   Challenge - Third party GIS solutions can work for agencies only if open source and interoperability standards are used.
   Opportunity - Using Florence as an example of GBA integration, other utilities can benefit. A third party solution is ideal for the fire and police departments. Full deployment of CAMA system will benefit PVA and investing in ESRI software by the School District for their applications. County Clerk integration would require a link up to a document imaging system that could allow deeds, plats and other scanned documents to be accessed. Train ArcMap power users from different agencies.

8) <u>Staffing</u>
   Strength - Very dedicated staff and good chemistry. Good problem solving skills.
   Weakness - As an increase in the number of users occurs, a corresponding increase in staffing is usually necessary to continue the same levels of support.
   Challenge - Each agency must determine who will be a power user. A commitment has to be made by each agency to hire computer literate workers and to continue training.
   Opportunity - Equip power users with appropriate software in order to perform advanced GIS functions. This will allow staff to address other tasks.

9) <u>ArcGIS Desktop</u>
   Strength - ArcMap is used for editing data and for performing advanced query and analysis.
   Weakness - Boone Map users don't realize how powerful ArcMap is and the utilization of Boone Map workstation.
   Challenge - ArcMap deployment requires an implementation plan for each agency. Training is essential.

Opportunity - ArcMap will allow advance mapping and analysis capabilities for other agencies, thus reducing the reliance on GIS staff.

10) Strategic Partnerships
Strength - Boone County GIS has relationships on all levels - federal, state, regional and local.
Weakness - Improve relationships with ESRI - fully aware of local needs.
Challenge - Keeping users engaged and setting work priorities.
Opportunity - Work with other agencies to implement geodatabase efforts, application development and web interfaces. Share knowledge about ArcSDE raster data with state department of geographic information. Leverage relationship with county about Citrix technology. Encourage greater participation in the data development process with certain organizations. Possibly peer review.

11) Accountability
Strength - Accountability is present and recognized by annual audit.
Weakness - Agency assessment amounts were derived over 10 years ago plus inflation. There is no tracking of staff time. GIS Advisory Board just gets updates on staff work.
Challenge - Reevaluate assessments so there is some equity with costs and benefits. Utilize software to track staff time and resources.
Opportunity - A project governance procedure could satisfy the need for increased accountability. Routine written reports of progress could be given. A committee structure could be explored to track work and responsibilities.

12) Financial Security
Strength - Diverse source of funding from 31 different entities. Still primarily funded by legislative units.
Weakness - Current funding system does not account for non-routine costs. This is done by special assessments. The Planning Commission does not charge an administrative cost to manage Boone County GIS, just salary and benefit costs for GIS Services Division employees. Personnel, equipment, software licenses and training costs continue to increase.
Challenge - A substantial increase in costs will occur if additional higher-end software licenses are purchased. Also, more funds will be needed for training.
Opportunity - Establish a special fund or account for a special assessment for member agencies. Also, a new approach to properly assess all agencies should be examined.

13) Recognition/Public Relations
Strength - Have a strong reputation in GIS community for being a "young" program. Won many awards and staff has participated in speaking at many state, regional and national GIS conferences.
Weakness - Not much time to focus on public relations when there are a lot of projects and work.
Challenge - Balance work with promoting one's work.

Opportunity - Set a goal each year in maximizing exposure of the program - awards, conference participation, published articles, ESRI recognition, project summaries posted on web and standards initiatives.

14) Advisory Board
Strength - Organized through an inter-local agreement and represents a partnership with certain responsibilities.
Weakness - Effectiveness of Advisory Board meetings - low attendance.
Challenge - To keep people interested in making the system better even if there is nothing wrong with it.
Opportunity - The Advisory Board and the Planning Commission has a great opportunity to set the future direction of Boone County GIS during the next 3-5 years. This Strategic Plan outlines 9 Program Strategies.

G. Program Strategies

1) Quality Service Delivery in Real Time - In order to address the increasing amount of GIS users and minimizing additional staff, all standard applications will be migrated to newer technologies (Internet, Terminal Services, Citrix, Mobile Connectivity, etc.) that are more conducive to efficient GIS service delivery (aka real time data updates).

2) Best Practices in GeoData Management - Staff will continue to refine it implementation of geodatabase data storage, versioning, geodatabase topology and domain table validation. Data custodianship will be transferred to agencies that express an interest and agree to an implementation plant.

3) System Integration - Staff will continue to be flexible to support interoperability with other member systems.

4) Strategic Partnerships - Staff will foster productive dialogues with other consortium members, other local, regional, state and federal GIS programs as well as with ESRI.

5) User Engagement - Staff will improve communication among users via increased correspondence and targeted user groups and/or committees.

6) User and Staff Development - Expansion of the current GIS training curriculum will occur by offering a GIS orientation for new employees as well as special ArcMap training for power users. This also includes appropriate training for staff.

7) Program Documentation - A succession management program that will ensure business continuity upon the departure of key personnel will be created and maintained.

8) <u>Project Governance, Prioritization and Decision Rights</u> - A formal process of reviewing, approving and documenting all aspects of long-term projects will be adopted by the Board.

9) <u>Program Recognition</u> - A more aggressive approach to promoting the achievements of Boone County GIS will be undertaken. This will include conference presentations and journal article submissions.

The following goals are recommended as part of the Boone County GIS Strategic Plan:

H.   Goals

1) Implement the best possible architecture for Boone County.

2) Form a diverse group of power users from each agency.

3) Create in internet-based GIS viewing application to replace all locally installed thick client versions of Boone Map.

4) Adopt project governance procedures and associated policies with oversight and decision rights assigned to the Advisory Board.

5) Integrate the GIS with other IT systems used by member agencies.

6) Thoroughly document all aspects of the program.

7) Empower users and increase the member agency's sense of ownership in the system.

8) Create and fund a training plan for the GIS Services Division and power users.

9) Add a staff member to the GIS Services Division to fulfill ArcSDE administration and system analyst needs.

10) Increase exposure for Boone County and the GIS Consortium Members by promoting GIS.

Finally, the Strategic Plan also outlines the following initiatives based upon the states goals:

I.   Administration

1) Develop a different budget process to adequately fund operational costs and special projects for Boone County GIS in the future.

2) Formulate process whereby the addition of new members are evaluated.

3) Adopt project governance and prioritization procedures and outline decision rights.

4) Cultivate beneficial relationships with reputable GIS programs and geospatial vendor community.

5) Increase program exposure.

6) Establish a set of statements to be used to promote an understanding of the basic expectations of consortium members.

7) The policies, procedures and tools relating to the GIS fee schedule and data and map requests will be reviewed and revised.

8) Boone County GIS.com will undergo a critical review and changes will be implemented to ensure that the website remains fresh and useful.

9) Project summaries will be published on Boone County GIS.com.

10) A system will be created to track the resources spent on projects.

11) A process for turning over the custodianship of GIS layers to members will be established.

J.   Technical Architecture

12) Upgrade and improve servers/system architecture.

13) A second (vector) third (raster) ArcSDE instance will be created and utilized for standardized published data.

14) A strictly regimented back-up, recovery and security strategy will be devised, implemented and documented.

15) New ArcGIS server web mapping services will be constructed using ESRI provided templates to replace the existing ArcIMS mapping services.

16) Create an internet-based standard GIS interface for all end users.

17) Eliminate all applications based on map objects language.
18) Upgrade desktop applications.

19) Upgrade mobile workforce.

20) A staff development plan that supports the ongoing improvements to Boone County's GIS technical architecture will be created.

21) Document data management.

22) Document layer file configurations and MXD prerequisites.

23) Document ArcMap layout templates.

24) Document ArcMap projects.

25) Document custom-built applications.

26) Document system architecture.

27) Document and promote global positioning hardware and software standards.

K. <u>**Systems Integration**</u>

28) Refine and document the rollover procedures for PSCC and ILEADS/CAD system.

29) Integrate the GIS with the PVA system.

30) Integrate the GIS with the County Clerk system.

31) Integrate the GIS with the Fire House software.

32) Integrate the GIS with the GBA CMMS.

33) Implement the Ederlog Shapefile integration module.

34) Integrate the GIS with systems used by the Building Inspection Department.

35) Integrate the GIS with systems used by the Planning Commission Department.

36) Procure an AVL system for use by police, fire and emergency management personnel.

L. <u>**User Empowerment**</u>
37) Facilitate the further adoption of ArcGIS desktop within member agencies' organizations.

38) Create a formal user engagement program.

39) Restructure annual user group into separate committees focused on specific aspects of GIS.

M. **Cartography**

40) Establish map layout templates for each agency.

41) Expand thematic map library offerings.

Each of the 41 initiatives has specific objectives in order to implement them along with dates to start and complete the work.

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I. INTRODUCTION

Background

The need for geographic data, applications and analysis is often taken for granted. It has been estimated that greater than eighty percent of the information stored by local governments in computer databases has a geospatial characteristic that enables it to be graphically represented on a map. Geospatially enabling computer data by placing it on a map often provides valuable insight into activities pursued by local government agencies. Geographic information systems have become the key to unlocking this potential.

The Boone County GIS program is managed by the Boone County Planning Commission (BCPC) in Northern Kentucky. The program began in 1993 and has grown into a consortium of thirty locally run agencies and a user base currently numbering almost 700. The program's focus is primarily on local government agencies in and around Boone County. Geospatial data is centrally managed by the BCPC's GIS Services Division and disseminated routinely to users employed by consortium members. Boone County GIS users utilize the system to help with a wide variety of functions ranging from simple address lookups and generation of mailing lists, to complex planning and growth studies and analysis. Printed maps and digital data are also available to the public, and a data subscription service has been established to fulfill the needs of the private sector for routinely updated data. Internet mapping sites are also in place to provide quick and easy access to GIS capabilities to anyone having an internet connection. To help ensure business continuity and provide a stable foundation, the Boone County GIS partnership intends to establish the program's future direction with this strategic plan.

Governing Partners		
▪ Boone County Fiscal Court	▪ City of Florence	▪ Boone County Planning
▪ City of Union	▪ City of Walton	Commission

Many of the agencies associated with Boone County's GIS consider this resource to be an essential part of their business activities, helping them to carry out many work-related functions. As such, these agencies contribute funding for the ongoing operations and maintenance of the system.

Contributing Members	
▪ Boone County School District	▪ Union Fire District
▪ Boone County Clerk	▪ Point Pleasant Fire District
▪ Boone County Water District	▪ Petersburg Fire District
▪ Boone County Library District	▪ Belleview/McVille Fire District
▪ Walton-Verona School District	▪ Burlington Fire District
▪ Boone County PVA	▪ Florence Fire District
▪ Sanitation District #1	▪ Hebron Fire District
▪ Kenton County Airport Board	▪ Walton Fire District
▪ Boone County Conservation District	▪ Northern Kentucky Independent Health District
▪ Boone County Arboretum	▪ Tri-County Economic Development Corporation

The GIS also supports the private sector's need for updated GIS data by maintaining interactive web mapping services on the internet. Because some companies maintain GIS expertise internally, they have exhibited the need to physically possess the data in order to perform

complicated analysis and mapping that may not be available to them on the internet. To accommodate this need, Boone County GIS has established a Data Subscription program in which participants receive more than fifty GIS layers including aerial photography; and are proactively sent updates for those layers every quarter. The funding generated by the subscription program serve to offset the annual contributions assessed to Partners and Contributing Members.

Data Subscribers	
▪ Cardinal Engineering	▪ Drees Company
▪ CDS Associates, Inc.	▪ Fischer Development Company
▪ James W. Berling Engineering	▪ Duke Energy

Some members of the GIS consortium have needs for data that extend beyond Boone County's borders and are managed by other entities. The first option that the BCPC pursues to remedy such situations is to solicit the other entities participation with the consortium. If this is not amenable to the entity, the BCPC then pursues a data sharing agreement in which Boone County GIS data is exchanged for the data needed by consortium members. Other data sharing agreements are in place to facilitate coordinated government. Relationships of this nature include agreements with the Kentucky Transportation Cabinet and the United States Census Bureau.

Data Sharing Affiliates	
▪ OKI Regional Council of Governments	▪ Northern Kentucky Area Planning Commission
▪ U.S. Census Bureau	▪ Northern Kentucky Area Development District
▪ Kenton County Fiscal Court	▪ Dearborn County Planning Commission
▪ Kentucky Transportation Cabinet	▪ Cincinnati Area Geographic Information System

Other public sector agencies that operate primarily in Boone County do not contribute to the operations and maintenance of the GIS system; Yet the BCPC supports them by providing the same level of GIS services as Contributing Members receive.

Non-Contributing Members	
▪ Boone County Sheriff's Office	▪ Boone Conservancy
▪ Boone County Success By Six	▪ Boone County Public Safety Communication Center
▪ Boone County Attorney	

Purpose

The strategic plan serves many purposes. First and foremost it is a business plan that guides GIS activities pursued by the GIS Services Division of the Planning Commission. The plan outlines strategies that serve to position Boone County's GIS to meet future technological, organizational, operational and financial needs. This document is Boone County's first formal strategic plan since the GIS was originally formed in 1993. The goals outlined within this plan represent the wishes of the partnership for the next five years of the program (2008-2012). The Boone County GIS partnership intends to revisit this plan every year and revise it as necessary at least once every five years to reflect shifting priorities and changes in technology that are relevant to that time.

Figure 1 illustrates the relationship between the various components of the strategic plan. The first few sections of the plan (the mission, values and vision) can be viewed as the foundation for the strategies, goals and objectives outlined by the plan, which are articulated in the latter half of the plan. As Figure 1 shows, the GIS program's mission should be grounded in the organization's values. Strategies endorsed by the partnership must facilitate the program's mission. The specific goals that are pursued by the program must fit within the context of one or more strategies; and the objectives, which have a wide-ranging scope, may support one or more of the stated goals of the plan.
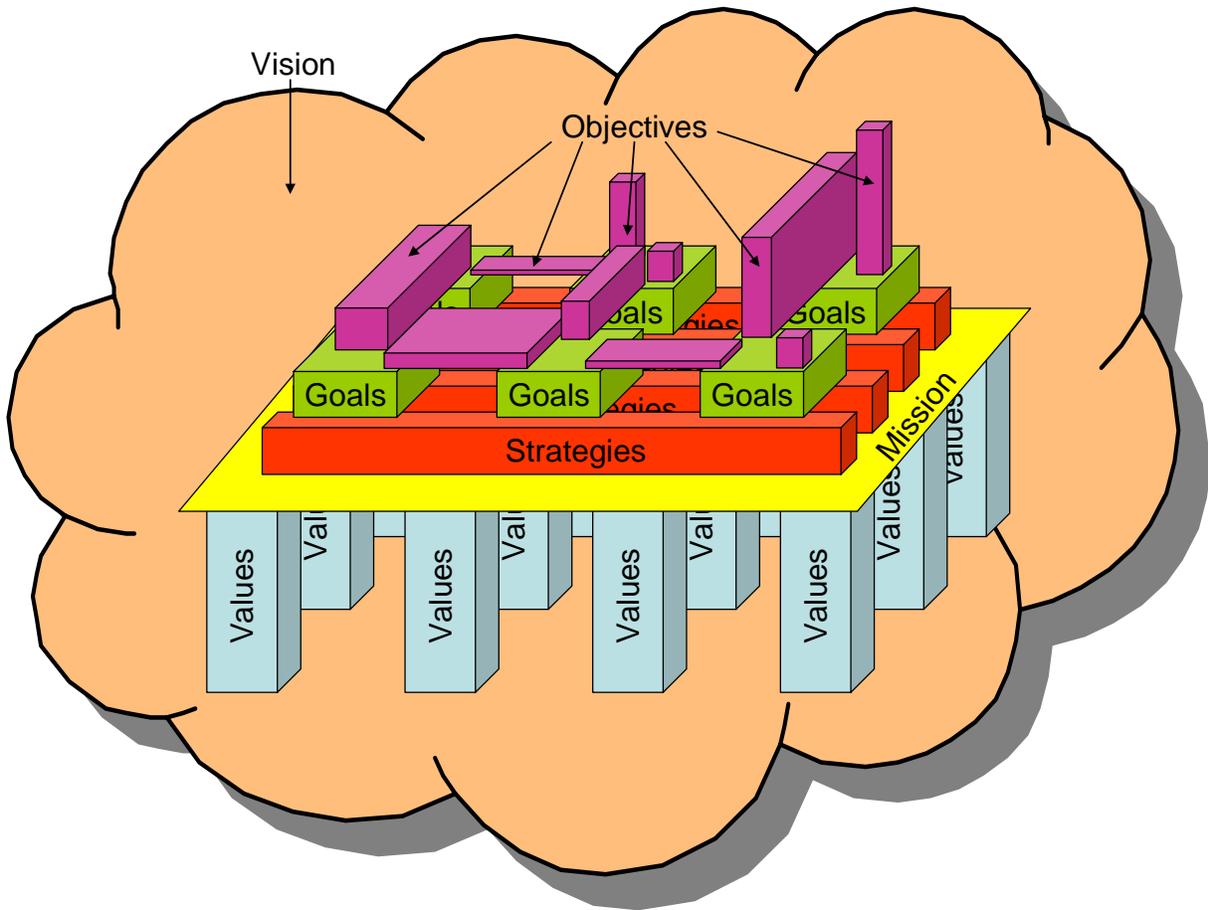
Figure 1: Strategic Plan Components

II. FOUNDATION

Mission

Improve service to Boone County residents and businesses by providing mapping capabilities, geospatial technology and geographic analysis services to local government agencies.

Values

The values outlined in this section are intended to portray the attitude of the GIS program. The values can be viewed as guiding principles of the GIS program, for which all decisions will be based upon.

Service: Boone County GIS is a service-oriented program. Staff will value service and treat users the same as they would treat the general public at their workplace.

Professionalism: Staff will be courteous and professional at all times. Staff will also be highly trained and uniquely qualified to deal with the activities they are charged with. Strategic partnerships with GIS/IT professionals from other agencies will be fostered.

Accountability: The scope and approach of projects will be presented to the partnership for approval, and project results will be reported to the partnership routinely during the work and upon completion. Funds available for the GIS will be managed with appropriate accounting principles.

Empowerment: Staff will be responsible for advising and coordinating GIS activities pursued by consortium members. End users will be trained to use GIS to answer questions and solve problems on their own whenever possible and feasible.

Integration: The GIS will continue to be designed with interoperability in mind in order to supplement and interact with a diverse array of IT systems in use by the many agencies that participate with the Boone County's GIS program.

Knowledge: The GIS will be grounded in best practices currently in use by other notable GIS programs. All projects will be well planned and well conceived, with justifications for key decisions documented.

Cutting Edge: The GIS must grow with modern technological trends in geospatial industry. The GIS will strive to always use current versions for software titles in use. The partnership will foster a work environment that considers innovative technologies and newly realized best practices a critical factor for the ongoing success of the GIS.

Results: Clear goals, objectives and performance measures will be identified by the partnership for all Staff work activities.

Vision

A vision of what Boone County GIS is striving for with its GIS program is one in which geospatial data and technologies are a vital part of every public agency in Boone County and in Northern Kentucky. This will result in recognition of Boone County's GIS program as a quality GIS implementation. This recognition can then be leveraged by all members of the consortium to promote their agency as a progressive and technologically advanced organization. Similarly, the partnership recognizes that a fully functioning enterprise GIS can be used as evidence for potential residents and businesses that Boone County is an exceptional place to live *and* work.

The following sections detail the vision for specific aspects of the GIS program.

Technology

Even though the rate of change in technology may have slowed in recent years, the pace is still rapid. Any future vision of Boone County's GIS must include a commitment to march in step with software produced by Environmental Systems Research Institute (ESRI). ESRI is currently the gold standard in the GIS software industry, and deviation from their product line is not anticipated. ESRI is constantly looking to improve their products, and these improvements inherently bring change. As long as Boone County commits to staying current with ESRI software versions and embracing these changes as they are put forth, the daunting task of trying to "catch up" to software applications generations ahead of the current platform can be avoided.

Systems Integration

GIS technology is not immune to the increased attention given to the integration between disparate IT systems. For a consortium that spans the diversity of professional disciplines as wide as those represented by the members of Boone County GIS, flexibility to interact with other information systems is an absolute necessity. Embracing open architectures, recognized standards, widely used software platforms and common programming languages can promote the interoperability that feeds cross-system integration. For integration with the GIS to succeed, third-party and internally built IT systems must adopt this same ideal.

Program Scope

The partnership intends for the GIS program to remain focused on serving public sector agencies that are charged with the provision of services to residents and businesses in Boone County. For projects that require a regional perspective, Staff will coordinate with other GIS programs whenever necessary. The existing relationship with the Commonwealth's Division of Geographic Information will be leveraged to facilitate communication and collaboration needs at the state and federal levels.

Consortium Membership

There are currently very few public sector entities in Boone County that do not participate with Boone County's GIS consortium. Nevertheless, the program will seek continued growth and furtherance of the philosophy that the GIS can be an information hub for all public agencies by pursuing additional agencies that provide services affecting residents and businesses in Boone County. The popular subscription program will be continued for private firms that require routine and frequent GIS data updates.

User Base and Agency Staffing

The partnership expects the number of Boone County GIS users to continue to grow. Staff will create an orientation program to inform new users about the program and its benefits. The orientation will include standard GIS training courses. Each consortium member will designate certain staff as "power users". Depending on the agency's needs, power users may be provided with and trained in advanced GIS using higher-end software solutions. Power users will become the resident GIS expert(s) for their agency and serve as a conduit for communication with the BCPC's GIS Services staff.

GIS Services Division Staffing

As the total number of users grows, expectations of the GIS Services Division will increase and result in an increased workload. As this occurs, the BCPC will need to consider the possibility of adding more staff to the GIS Services Division or increase the use of technology to accommodate the additional workload.

III. SITUATIONAL ASSESSMENT

User Base

Recent Growth

It has been a long-time belief among the partnership that putting GIS and mapping capabilities in the hands of the end user is the best way to approach GIS in local government. To this end, Boone County's GIS program currently services nearly 700 individuals, including more than 200 in-vehicle police and fire installations. These users are scattered throughout the county and are employed by more than forty public-sector agencies. Because of the segmented nature of local government services in Kentucky, Boone County's standard GIS application has evolved into the only system that is used by all of the many different public agencies in the County. As such, it has become an information hub, bringing together data from many different sources. This characteristic ultimately provides a conduit for communication, collaboration, cooperation and coordination.

Recent Growth

Experience has taught us that there is a direct correlation between an increase in the number of users for an agency and the amount of time devoted to service that agency. Figure 2 illustrates the growth in Boone County GIS users over the last several years. Although a growing user base is a sign of a successful program, the downside to such growth is the potential need to increase staffing for the GIS Services Division to support additional users. The program's struggle with the growth in users can be partially blamed on its reliance on thick client software installations and the subsequent need for local data updates and application upgrades.
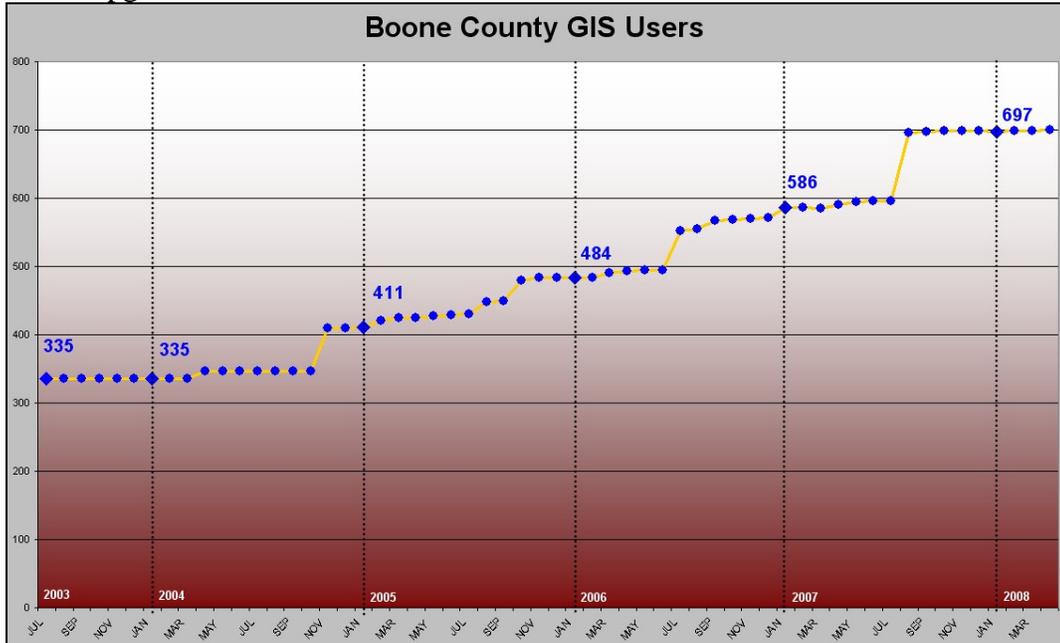

Figure 2: Growth in GIS Users Since 2003

7

Challenges

Recent Growth

Even though growth is frequently viewed in a positive context, the goal of this strategic plan is to ensure a stable program for Boone County. Unchecked growth for growth's sake that does not take into consideration the downstream ramifications of such growth is never a good strategic move. When deciding whether or not to increase the user base by adding additional member agencies, the BCPC should always seek to ensure that the needs of existing member agencies are satisfied before pursuing the addition of more agencies.

Future Growth

The addition of a large numbers of users in a short period of time can spell disaster for a program seeking a stable foundation. Because of the team oriented nature of the consortium, additional public agencies are usually welcomed. To ensure that continued success of the program upon the addition of new members, a formal review process should be undertaken to determine precisely the needs and expectations of the new members. During this evaluation, the BCPC should attempt to determine how the addition of new members may impact the GIS Services Division resources and their existing workloads.

Opportunities

Future Growth

Continued growth in numbers should be viewed as a sign that the GIS is successfully helping agencies perform their job functions. The concept of power users, which is discussed throughout this document, has the potential to increase the benefits to member agencies by assisting with a greater number and variety of business functions performed by the agency.

Seeking additional agencies to participate with the GIS program has the potential to reduce annual assessments for existing member agencies by spreading out the operational costs among a greater number of stakeholders. The belief that Boone County GIS applications serve as an information hub for data produced by disparate agencies can be furthered with the addition of more agencies to the consortium. These agencies include the Transit Authority of Northern Kentucky (TANK), the Northern Kentucky Area Development District (NKADD), the Boone County Extension District, the Northern Kentucky Water District, Duke Energy, Owen Electric Cooperative and Insight Communications.

Power Users

GIS Power Users can be viewed as GIS experts within a given agency. With a few exceptions, the current group of power users in Boone County could simply be considered to be the GIS Services Division of the BCPC. Supporting the addition of power users within each individual agency can help by allowing the agencies to perform advanced queries and analysis on their own without having to rely on the GIS Services Division. Not only does this empower agency employees who inherently understand their business processes better than the GIS Services Division, it also reduces the strain on the GIS Services Division from the growth in users. Such a group of power users would need to have access to and training on high-end GIS software such as ArcMap.

Application Migration

Custom applications have always been a big part of the services provided by the GIS Services Division. Thick client applications that are installed directly onto users' workstations have always been the norm for GIS users in Boone County, but these are now posing a threat to the stability of the program because of the amount of resources it takes to keep the applications and the GIS data up to date. To combat this, the BCPC must consider new paradigms for delivering standard GIS applications. ESRI's newest application

development environment – ArcGIS Server, is beginning to look like a viable solution to Boone County's thick client woes by providing a development platform for web services that serve up advanced GIS functions. By serving up standard GIS applications over the internet, the GIS Services Division can update the application at one location and avoid the need to travel throughout the county to update hundreds of workstations. Likewise, the web applications can connect to data that is stored in ArcSDE which gets updated in real-time, so the GIS Services Division do not have to travel throughout the county every month to update the shapefile data currently being utilized by locally installed BooneMap applications.

Technical Infrastructure

Strengths

Server Architecture

The program currently runs on three production servers and one test server. The servers are tasked as follows:

- BCGISSDE – Primary database server housing two enterprise geodatabase (ArcSDE) instances.
- BCGISIMS – Primary application server hosting ArcIMS and ArcGIS Server web services.
- BCGISFILE – Primary file server sharing published data and BCPC work files.
- BCGISTEST – Primary application development and testing environment.

Desktop Hardware (GIS Services Division)

Desktop hardware for the GIS Services Division staff is near the top end of what the GIS software makers recommend. A rotating deployment strategy is employed by the BCPC to ensure that the GIS Services Division continually has top-of-the-line workstations.

GIS Software Platform

Nearly all GIS activities are carried out using ESRI software or ESRI compatible third party solutions. These include the following ESRI software products: ArcGIS Desktop (ArcInfo, ArcEditor and ArcView), ArcIMS, ArcSDE, ArcGIS Server, ArcReader, ArcPad, ArcPad Studio, and MapObjects. After a brief testing period, the GIS Services Division typically deploys updated software versions released by ESRI whenever they become available.

Global Positioning System Hardware

GPS technology has also become an important technology for many agencies in Boone County. Sub-meter hardware devices (GeoXT) made by Trimble have been adopted by several consortium members to service their GPS needs.

Networking

The networking infrastructure that supports the GIS Services Division is managed by the Boone County Fiscal Court's Information Services Department. The GIS Services Division is very comfortable working with this group and is confident that they share the GIS program's philosophy that conforming to modern technology trends is the best way to avoid major problems.

Weaknesses

Desktop Hardware (Consortium Agencies)

Because the program is a consortium of disparate agencies with their own IT budgets and philosophies, the technology standards adopted by the BCPC cannot be dictated to member agencies. The GIS Services Division publishes minimum hardware specifications for the GIS applications under their purview, but many agencies continue to provide their GIS users with sub-standard machines. Most geographic information system applications require

greater computing power than what is typically required for non-GIS office software such as word processor and spreadsheet applications. Many agencies do not currently have an aggressive hardware replacement strategy in place, which poses a significant challenge to the GIS Services Division when they release updated versions of their GIS software. This is due to the fact that as software matures, the minimum system requirements for newer versions usually increase.

GIS Software Platform

A couple of examples of GIS software that is not based on ESRI technology currently exist among consortium members. The most prominent of these is perhaps the ILEADS/CAD system in use at the Public Safety Communication Center (PSCC). This system has a built-in mapping component that is based on Intergraph software technology. Recently, PSCC requests to incorporate global IDs required by the Intergraph-based system into Boone County's GIS data have revealed some incompatibility issues that are placing a data maintenance burden on the GIS Services Division. Although the GIS Services Division has accommodated PSCC's need for GIS data by performing complex data translations, these efforts would most likely be unnecessary if the PSCC could employ a software package that utilizes GIS data based on an ESRI standard format.

A system in use by the Boone County School District's bus garage uses a proprietary built-in mapping component. This system has limited capabilities to integrate ESRI formatted data. These limitations result in the bus garage staff having to duplicate the GIS Service Division's digitization of certain GIS features. Not only does re-digitizing features waste time and effort, the manner in which the features have been digitized in the past has the potential to produce erroneous results in the bus garage's system.

Global Positioning System Hardware

Although there have been no requests to date for GPS hardware devices rated at any accuracy other than sub-meter, three distinct accuracy levels currently exist in the marketplace – survey grade, inventory grade, and recreational grade. The GPS devices currently in use among consortium members are all inventory grade and are rated at sub-meter accuracy. Since they are all the same model (Trimble GeoXTs), they have in effect become Boone County's standard for sub-meter devices. However, the GIS Services Division could be proactive in establishing standards for devices in the other accuracy rating categories.

Networking

Boone County has embraced a significant improvement to GIS data management by employing ESRI's ArcSDE geodatabase technology. However with the continued reliance on thick client applications, remote sites cannot take advantage of the geodatabase.

Challenges

Desktop Hardware (Consortium Agencies)

Setting standards is certainly one of the GIS program's primary purposes. Yet under the current organizational paradigm, hardware standards can only be put forth as a suggestion rather than a requirement. The GIS Services Division is expected to provide a satisfying level of service regardless of whether or not an agency's technology conforms to standards endorsed by the program. The GIS Services Division needs to be more vocal in promoting hardware standards among consortium members.

GIS Software Platform

It is unrealistic to think that all IT systems having a mapping component that are procured by all consortium agencies will be based on ESRI technology. It therefore becomes

critically important for consortium members to select and/or build systems that are committed to cross-system interoperability. As with the hardware standards mentioned above, it is incumbent upon the GIS Services Division to promote these ideas throughout the consortium.

Networking

A centrally managed network backbone that physically connects all remote sites to the GIS Services Division (i.e. Fiscal Court Information Systems) network would resolve the data format issue and allow all users to access the vastly superior ArcSDE geodatabase. However, when the GIS Services Division has questioned this possibility to other IT professionals, the others have stated that this would be an uphill battle due to cost and control issues.

Opportunities

Desktop Hardware (Consortium Agencies)

{see "Networking" below in this same section}

GIS Software Platform

Agencies that are procuring or building new IT systems that will be expected to integrate with the GIS must invite the GIS Services Division to participate with the discussion and procurement process at the earliest possible time; rather than after the new system has been deployed.

Global Positioning System Hardware

One opportunity that Boone County could consider taking on would be the establishment of a Virtual Reference System (VRS). A VRS is a network of locally managed GPS base stations that facilitate the real-time correction of GPS measurements taken in the field. Not only could this benefit the GIS program and all of its member agencies, but the benefits could extend to the community and public at large. It is likely that this would be very popular with the engineering, surveying, and development community. The State of Ohio has already established a statewide VRS which makes the possibility of Boone County establishing such a network much easier.

Networking

ArcGIS Server promises to change the way Boone County GIS does business by providing a platform for comprehensive GIS service delivery over the internet. This has the potential to solve many mounting problems for the program, including the impact of client hardware inadequacy. Using the internet as the primary means of GIS service delivery has the added benefit of enabling all users to take advantage of the ArcSDE geodatabase format, while eliminating the need for a costly county-wide physical network backbone.

Custom Application Development

Strengths

BooneMap (Classic and Lite Versions)

Shortly after many of the base mapping layers were initially completed in 1999, Boone County embarked on an aggressive strategy of custom GIS application development. These efforts resulted in a series of customized GIS applications that fall under the 'BooneMap' title. Screen captures of each of the BooneMap versions can be seen in Figure 3 below.

The very first BooneMap application (renamed 'BooneMap Classic' after the development of BooneMap Lite) was a standalone desktop interface created with ESRI's MapObjects and Visual Basic and was released by the GIS Services Division in 2001.

The second version (and current desktop standard) – BooneMap Lite (or 'LT'), was released by the GIS Services Division in 2005 and is built utilizing ESRI's ArcReader components and coded in C-sharp programming language with Visual Studio.NET 2005.

BooneMap Workstation (i.e. ArcMap Extension)

In 2006, an ArcMap extension named BooneMap Workstation was released for Boone County's ArcMap users. The extension is designed specifically to work with Boone County GIS data and streamlines many common tasks including queries and common search requests.

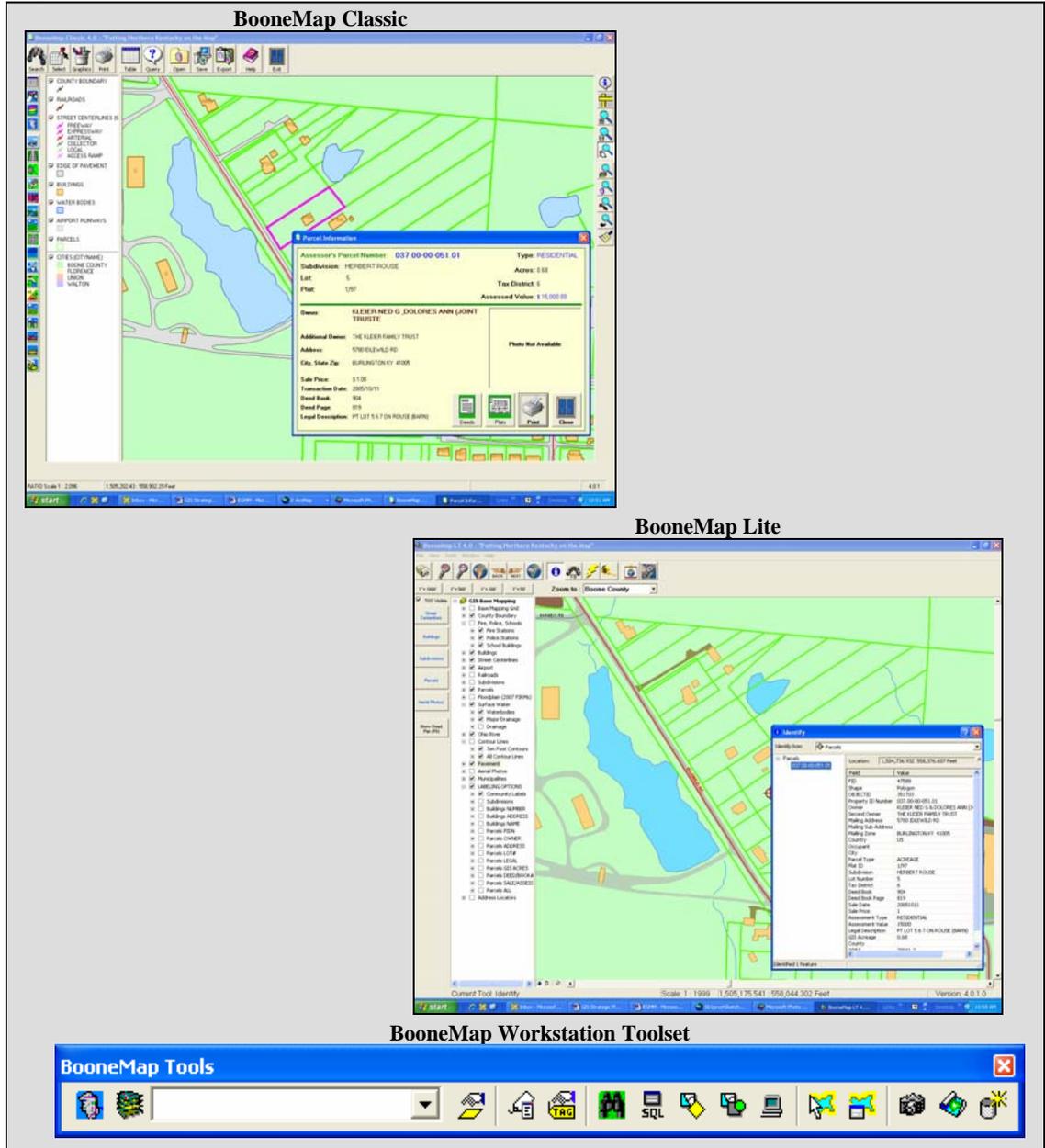**Figure 3: Current Versions of BooneMap**

Mobile GIS & GPS-Based Field Editing

The GIS Services Division has developed customized mobile GIS solutions using ESRI's lightweight ArcPad software. To date, these solutions have been deployed on Trimble

GeoXT hardware for the Boone County Water District, the City of Florence's Public Services department and the Boone County Arboretum. The ArcPad solutions for the utility agencies have been integrated with a CMMS system widely used in Northern Kentucky.

Weaknesses

BooneMap (Classic and Lite Versions)

BooneMap LT, which is the current standard, supports only simple functionality. Fortunately, this is all that is required by a majority of users (deemed 'casual users'). Power Users that have a need for advanced functionality currently have two options – they can use BooneMap Classic, which offers slightly more functionality than BooneMap LT; or they can purchase ESRI's ArcGIS Desktop, which gives them access to BooneMap Workstation along with the outstanding and far superior out-of-the-box functionality that is built into ArcMap. MapObjects (BooneMap Classic's native language) is an antiquated language that ESRI is no longer supporting.

Application Maintenance Efforts

With so many users spread throughout the county, a large amount of the GIS Services Division time is spent traveling to the remote sites to install BooneMap and deploying upgrades as they are released. Because both versions of BooneMap rely on data that is installed either locally on the workstation or on a network at the remote site, the GIS Services Division spends additional time traveling to remote sites to provide data updates.

The mere fact that Boone County has to manage two separate BooneMap applications – Classic and Lite, puts a unnecessary strain on the GIS Services Division. BooneMap Classic is based on MapObjects version 2.0 and Visual Basic version 6, which are both outdated programming languages. Conversely, BooneMap Lite is based on ArcObjects and ArcReader and programmed in C-sharp in Visual Studio.NET, all of which are current and conform to modern application development practices.

Application Development Training

The GIS Services Division does not have what most would consider to be an expert programmer on staff. Application development tends to progress somewhat slower than what may normally be expected and often involves a "spaghetti coding" approach (a.k.a. trial-and-error) to custom programming initiatives. The lack of formal training in programming techniques and languages is therefore a deficiency that could be resolved with a greater commitment from the Advisory Board to fund such training for certain members of the GIS Services Division.

GIS Data Editing Practices

The GIS Services Division has grown to rely internally on many sample scripts to assist with certain editing functions. These scripts are generally created by end users and posted on ESRI's website to download for free. As such, they are not supported by ESRI and no guarantees are given that the scripts will be updated to work with new ESRI software versions as they are released. Considering that Boone County strives to embrace new versions as they are released, the obvious dilemma relates to sample scripts that have become mission critical to certain editing functions that are not supported by ESRI's new software versions.

Challenges

Mobile GIS & GPS-Based Field Editing

Although the GIS Services Division has developed customized mobile GIS solutions that integrate with a third-party CMMS in use by the City of Florence, the simple fact that it *is* a

third party solution presents some challenges. Foremost is the fact that, since the GIS Services Division did not author the CMMS, they are not experts at the underlying data structure and application functions that interact with the data. As with nearly all third party systems, updates are routinely issued by the vendor. With each update, it becomes important for the GIS Services Division to study the release notes to determine if adjustments need to be made to the custom ArcPad solutions to ensure they continue working as designed.

Application Maintenance Efforts

The maintenance of thick client applications (i.e. BooneMap) is draining staff resources. If the numbers continue to rise as shown in Figure 2, the increased support required by such an increase has the potential to eventually drag down the program altogether. To reduce the effort currently required to support the GIS applications, the program must find a way to leverage the internet and other thin client service delivery architectures such as those that involve Citrix or Terminal Services. A shift away from locally installed applications will almost definitely meet with resistance from users who refuse to consider anything different from what they have grown accustomed to.

Application Development Training

As with most IT-related coursework, formal training in application development techniques and languages is not inexpensive. A typical week-long course from either Microsoft or ESRI can cost more than $2000. This cost is often hard for decision makers to approve. Consider that there are literally dozens of courses that the GIS Services Division could benefit from, and the total cost of a comprehensive training program could be exorbitant.

GIS Data Editing Practices

Minimizing the reliance on sample scripts is critical to ensure that the program can move forward with new versions of ESRI software as they are released. To do so, the GIS Services Division must study the ArcObjects code that facilitates the specialized functions carried out by the sample scripts. This essentially involves reverse engineering the sample scripts to the point where the GIS Services Division can understand and re-work the code as necessary when new software versions are put forth by ESRI. Training in ArcObjects coding must be pursued in order to achieve these goals.

Opportunities

BooneMap (Classic and Lite Versions)

Minimizing the number of custom applications would benefit the program by allowing more resources to be spent focusing on improving the custom applications that remain. The newer and more powerful successor to the MapObjects language is ArcObjects. All of the custom applications created by the GIS Services Division utilize ArcObjects except for BooneMap Classic, which uses MapObjects. Eliminating BooneMap Classic means Staff can focus in on refining their expertise in ArcObjects – clearly the future direction for ESRI.

BooneMap Workstation (i.e. ArcMap Extension)

This strategic plan is endorsing the idea of increasing the use of ArcMap through the creation of a group of power users who will be employed by the individual agencies that participate with the consortium. ArcMap is much more powerful than either BooneMap Lite or BooneMap Classic and will enable more advanced GIS use throughout the consortium. To help facilitate the increased use of ArcMap, the GIS Services Division has created a custom extension that runs inside of ArcMap, which should make the initial adoption of such software much easier for agencies to achieve.

ArcGIS Server

A lot of hope is being placed in ArcGIS Server. This product fits within Boone County's standard architecture (i.e. it is ESRI based and uses the ArcObjects programming language) and is designed to support advanced GIS functions via a web browser application interface. For many Boone County users, the GIS is merely a tool that enables them to quickly print a map or find an address or street. Yet there are many business operations that can still be improved via further integration with GIS. The BCPC hopes to utilize ArcGIS Server to continue providing not only basic services, but more customized and advanced functionality to end users as well.

Website

Strengths

ArcIMS

The BCPC maintains a web presence by providing interactive mapping services using ESRI's ArcIMS. These are available to anyone with an internet connection and are utilized by nearly six thousand visitors per year.

Current ArcIMS Web Services	
▪ County-wide Base Mapping	▪ High School Districts
▪ City of Florence Base Mapping	▪ 2030 Future Land Use
▪ City of Union Base Mapping	▪ Historic Structures
▪ City of Walton Base Mapping	▪ Topography
▪ Northern Kentucky/Cincinnati Airport	▪ Zoning Boundaries
▪ Boone County Sexual Offender Watch	▪ Voting Precincts
▪ Northern Kentucky Control Point Network	▪ Points of Interest
▪ Elementary School Districts	▪ Boone County Arboretum
▪ Middle School Districts	▪ Parks and Recreation

ArcGIS Server

As seen with ArcIMS, ArcGIS Server product includes out-of-the-box web service templates. In keeping with the program's tradition of employing the newest and best technology, the GIS Services Division has already deployed five ArcGIS Server web mapping services utilizing these generic templates.

Current ArcGIS Server Web Services	
▪ County-wide Base Mapping	▪ City of Walton Base Mapping
▪ City of Florence Base Mapping	▪ Parks and Recreation
▪ City of Union Base Mapping	

BooneCountyGIS.com

Boone County's GIS website provides a central location for general information about the program. Visitors can learn about the consortium and its member agencies, discover in-depth metadata regarding the GIS data sets maintained by the program, download forms to submit for digital data and map requests, and submit questions to the GIS Services Division. The BCPC owns the domain name until 2014.

Weaknesses

ArcIMS

ArcIMS provides a very good service, but advanced functionality such as spatial queries are not possible with this platform. This is perhaps the largest reason that ArcIMS has failed to supplant BooneMap Classic as the primary means of GIS service delivery.

The ArcIMS services that are currently published by the GIS Services Division originate mostly from out-of-the-box web templates. Other ArcIMS websites have been customized and tailored to be somewhat flashier with subtle yet interesting tweaks to the web interface.

BooneCountyGIS.com

Although there is quite a bit of information about the program available on the site, much of it is basic. The website underwent a major overhaul when the current domain name was acquired in January 2005. Since then, the general look and feel has not changed much. The current look and feel has served the GIS program well, and change for change's sake is not always a good thing; but the program should not allow the website to become stale, so periodic review is called for to assure a fresh and functional website.

Challenges

ArcIMS

Although it is widely believed that ArcGIS Server may someday replace ArcIMS, its retirement date has not been set. If a determination is made that ArcIMS should stay up and running, then plans to move away from the generic templates should be pursued in order to increase the functionality and better brand the web services to link it to Boone County's GIS program.

ArcGIS Server

As stated throughout this document, ArcGIS Server holds great potential for resolving many of the GIS program's upcoming issues relating to the retirement of BooneMap Classic and Lite. The biggest obstacle to achieving this goal is the need to go above and beyond the functionality offered with out-of-the-box ArcGIS Server templates. Both versions of BooneMap offer the ability to perform functions that are more advanced than the generic templates that are currently found at BooneCountyGIS.com. Part of the solution to this challenge involves increased training for the GIS Services Division.

BooneCountyGIS.com

Keeping the website fresh and interesting should always be viewed as a constant challenge. The GIS Services Division should periodically review the websites of other notable GIS programs and attempt to emulate website characteristics that may be better than what Boone County is publishing at that time.

Opportunities

ArcIMS

The GIS Services Division should continue its recent activities involving the integration of web mapping services with member agencies websites. Previous successes along these lines have included integration with websites published by the Boone County Arboretum, the Boone County Property Valuation Administrator, the Boone County School District, the Boone County Fiscal Court's Parks and Recreation Department and the Boone County Sheriff's Office. Utilizing ArcIMS would be the easiest platform to utilize in the near term simply because of the experience and knowledge gained from previously successful projects. However, ArcGIS Server web mapping services may yet prove to be the best choice for such cross-agency website integration initiatives.

ArcGIS Server

If the newly released ArcGIS Server lives up to its billing, it will open up a world of possibilities for using the internet as a primary means of delivering GIS services. The key to maximizing this potential lie in the ability to customize web services to perform specific business functions that will satisfy individual needs. ESRI is pushing this product very hard,

and may be interested in teaming up with a GIS program such as Boone County that has a long tradition of successful custom programming initiatives.

BooneCountyGIS.com

Revamping the website should be pursued on a continual basis. The website should also have a location for project summaries and detailed reports on the GIS Services Division activities. The project post-mortem reports that are suggested later in this document as part of the project governance procedures could satisfy the need for such project summaries.

GeoData Management

Strengths

Enterprise Geodatabase Storage

Boone County first began using the geodatabase format in 2003. In 2004, the GIS Services Division upgraded from personal geodatabases to a single enterprise geodatabase (ArcSDE). In January 2006, the GIS Services Division completed a comprehensive schema re-modeling effort for all Boone County data holdings. During this project, particular attention was paid to local priorities, adoption of recognized standards, and conforming to refined data modeling practices. These efforts also resulted in detailed documentation of publishing translation models.

Layer Files

The GIS Services Division uses standardized layer files (*.lyr) to enhance the published data by establishing consistent symbology, labeling, and attribute configurations. Layer files take a lot of the guesswork out of the equation for end users and improve communication among disparate government entities by establishing standards.

Weaknesses

Security and Data Backup/Recovery

Certain data security strategies are in place, but they have not been tested and refined. A formal strategy should include measures to deal with the protection of sensitive data, a solid backup and archiving protocol, and restore/recovery procedures from such archives.

Layer Files

Documentation of the layer files are incomplete and in the process of being updated. There are instances where the data that underlies the layer files get altered, which affect the performance of the layer files. Proper documentation would assist with ensuring that layer files get updated as necessary.

Challenges

Enterprise Geodatabase Storage

The GIS Services Division should ensure that the geodatabase model stays flexible and conforms to federal and state data schema standards. Staying on top of this is a challenge and would be assisted by maintaining good relationships and frequent contact with major players in the state and federal GIS community.

Security and Data Backup/Recovery

Challenges to the creation of a formal data security strategy include the lack of familiarity with SQL Server 2005 – the repository for the ArcSDE geodatabase. Automating routine backup and recovery procedures for both the production and published data will be necessary.

Distributed Custodianship

At the present time, the GIS Services Division is responsible for data maintenance of most of the GIS layers in production within the consortium. As the county continues to grow, the amount of work involved in maintaining the GIS data may grow along with it. If the data maintenance burden becomes too great, it could force some special projects to grind to a halt. Strategies aimed at distributing the custodianship of certain layers are one way to prevent this from happening. Distributing the data custodianship can be fraught with challenges involving costs, training and support issues. Each initiative that is meant to distribute the custodianship of GIS data must therefore be carefully planned, reviewed and approved by the Advisory Board.

<div align="center">

Opportunities

</div>

Enterprise Geodatabase Storage

The use of the ArcSDE geodatabase would be increased if the potential for ArcGIS Server web mapping services could be achieved. Capitalizing on the momentum generated recently with regard to ArcSDE implementation and geodatabase modeling should be continued.

Security and Data Backup/Recovery

A formal data security strategy must be a priority for year one of this strategic plan. The GIS Services Division should research tried and true backup and recovery practices and endeavor to employ such practices to ensure continuity of the GIS. One rather simple goal would be to partner with a nearby GIS program and agree to exchange and store each other's data on a routine basis.

Distributed Custodianship

When considering that many of the anticipated future challenges for the program deal with dwindling resources of the GIS Services Division, it seems worthwhile to explore the benefits of handing off the data upkeep to the agencies that have a vested interest in making sure those layers stay updated. Other respected GIS programs have proven that maintaining GIS data as part of daily workflows improves efficiency and results in better GIS data integrity.

Cartography

<div align="center">

Strengths

</div>

Boone County Streets and Points of Interest Map

The BCPC is very proud of its history of producing professionally printed Streets and Points of Interest maps that cover the entire county. In 2007, the GIS Services Division produced its eighth edition of the map since 1998. The map contains a detailed street index table allowing users to locate any street in the county. Inset maps that show Burlington and the CVG Airport are also included. In addition to the streets, the map also highlights Boone County points of interest that include features ranging from golf courses, historic buildings, libraries, parks, schools, and government buildings, among others. This map is extremely popular with the public causing many phone calls to ask when the next edition is being printed.

City of Florence Streets and Points of Interest Map

The GIS Services Division also works with the City of Florence's Public Services Department to produce a Streets and Points of Interest map that focuses on only the City of Florence. The third edition of this map was produced in 2007. Insets displayed on this map

include Mall Road, the Florence Government Center, Florence Main Street and the Houston Road corridor (which was added in 2007). As with the County Points of Interest map, the Florence Points of Interest map is extremely popular with the public.

Boone County Arboretum Map

In 2005 following a GPS project that saw the GIS Services Division assist the Boone County Arboretum with inventorying their plant and tree collection using sub-meter GPS technology, the GIS Services Division produced a map of the Arboretum that detailed the locations of every plant being managed by the Arboretum staff. The map included the plant and trees so that the public could learn about the plants and trees as they toured the Arboretum. This map was so well put together that it won the best map award at the 2006 state GIS conference. A second edition of the map was produced in late 2006 showing the updated inventory based on the ongoing GPS work now being performed by the Arboretum staff themselves.

Standardized Mapping Templates

In 2005, the GIS Services Division created standard mapping layouts in ArcMap to be utilized for routine mapping requests. These layouts were compiled in the form of *.mxt files. Not only do these templates ensure that all maps produced by the GIS Services Division have a similar look and feel, these templates also benefit the GIS Services Division by ensuring that all maps that are produced contain certain critical elements such as disclaimers, north arrows, and scale bars. The BooneMap Workstation extension contains a tool that works in conjunction with the standard layout templates to streamline the process of changing the map title, printer, page size. In addition, the BooneMap Workstation tool also stamps the date and time that the map was created, along with the ArcMap project filename so that the project could be more easily located weeks and months later for reprinting.

Report Supplements

All versions of BooneMap that are provided to member agencies contain map printing capabilities. This has enabled individual BooneMap users to print their own maps containing content chosen by them to use as they see fit. One benefit that has evolved from these capabilities is the user's ability to incorporate maps into their agency's internal reports. A good example of this would be the map included in the award winning Union Town Plan.

Specialty Maps

Several maps have been produced by the BCPC that pertain to specialized themes. These include a Land Use map that is produced in conjunction with the five-year revision of the County's comprehensive plan that is required by state law. The BCPC's Historic Preservationist has used the GIS to produce a Historic Cemeteries map and two editions of a Heritage Tourism map which details the locations of historic structures in Boone County.

Weaknesses

Standardized Mapping Templates

The standard mapping templates compiled by the GIS Services Division are a huge benefit to expediting the creation of maps. These efforts could be expanded to include standardized mapping templates for each agency. This would allow each agency to brand their maps which would help promote their agencies.

Report Supplements

The version of BooneMap Lite that is based on ArcReader 9.1 does not allow users to edit the map title. ArcReader 9.2 has remedied this problem, but the GIS Services Division has not yet migrated its programming code to incorporate this additional functionality.

Specialty Maps

There is quite a bit of room to add additional specialty maps to Boone County's existing collection. In fact, the Boone County Planning Commission has approved a fee schedule in 2006 for a list of specialty maps that have not been produced yet.

Challenges

Streets and Points of Interest Map (Boone County and City of Florence)

The major challenge with the Streets and Points of Interest map is keeping it fresh and interesting. Considering that there have been eight editions of the county-wide map produced and three editions of the Florence map produced, these maps are being constantly tweaked with each update. In a sense, this is good because it is slowly getting better and better over time. But the negative aspect of this is that the map looks somewhat the same, which may cause some people to view it as antiquated.

Standardized Mapping Templates

Some may argue that the creation of separate map layout templates for each agency is opening up a can of worms. There will certainly be a lot of work involved, so time management may be a challenge. It should be made clear to agencies the purpose of such templates. Periodic updates to the templates are inevitable, but frequent revisions should be discouraged due to the amount of time it might take to manage such changes. .

Report Supplements

Because of the lack of much formal training in application programming, updating BooneMap Lite to leverage the additional functionality found in ArcReader 9.2 will be a challenge. The GIS Services Division usually rises to successfully meet such challenges, but it is difficult to estimate the time and effort involved that may be necessary to achieve this.

Specialty Maps

Perhaps the biggest challenge to compiling more standardized thematic maps is going to be budgeting the time to construct them. Other challenges may be incorporating additional cartographic functionality provided within ArcGIS Desktop 9.2.

Opportunities

Standardized Mapping Templates

Standardized map templates for each agency will be a benefit to everyone involved. This will expedite the work of the GIS Services Division and the consortium members should be more satisfied with their maps. It's important to note that once an agency's map template is completed, it can be used in the agency's default BooneMap Lite projects, which is what most users will use to produce maps for report supplements.

Report Supplements

Updating BooneMap Lite to leverage the additional functionality found in ArcReader 9.2 will allow end users to create their own map title. This should be high on the priority list for the GIS Services Division as printed maps with a generic title are less likely to be used to supplement reports.

Specialty Maps

The GIS Services Division is fortunate to have a staff member who excels at cartography. Time should be set aside for this staff person to slowly build up Boone County's standard thematic map library. The GIS Services Division should research and learn more about the additional functionality relating to cartography and stored representations and incorporate these into the specialty maps.

Systems Integration

Many agencies have their own IT systems that perform specific functions. The GIS Service Division is often asked to map the data captured by these systems and/or perform some sort of integration between the GIS and their system.

Strengths

GBA

During 2006 and 2007, the GIS Services Division made huge strides in integrating the GIS with the CMMS system in use by the City of Florence's Public Services department. The GBA data model was adopted as Boone County's standard for sanitary, storm, and water utility data and all of Boone County's data (even that which is not under the purview of Florence), was migrated to the GBA schema. An ArcSDE geodatabase was deployed at Florence, and initiatives aimed at creating custom ArcPad forms were begun. So far, the water inventory forms have been created which has been deployed to the Boone County Water District as well as the City of Florence.

ILEADS/CAD

Near the end of 2004, the GIS Services Division undertook a project that resulted in the mapping of crime data that is stored in the ILEADS/CAD system run by PSCC. This project resulted in two layers – all arrests and reported offenses dating back to 1998. The GIS Services Division helped the Boone County Sheriff's Office procure an ArcView license of ESRI's ArcGIS Desktop software which was intended to assist with the analysis of trends and patterns.

PVA

The GIS Services Division integrated the GIS with the assessment application used by the Boone County PVA in 2007. This resulted in the elimination of duplicate data entry and freed up GIS Services Division staff to focus on other projects.

School Districts

Twice every year, the GIS Services Division receives a data extraction from both School Districts in Boone County in order to geocode all of the students in Boone County. These layers are used by the school districts to study school population dynamics, bus routing and facilities master planning, among other things.

Weaknesses

GBA

Although integration with GBA is one of the largest cross-system integration successes to date, there is still much to do. One apparent weakness is that the City of Florence and the Sanitation District #1 (also a GBA user) utilize two distinctly different sets of domain tables. The sanitary sewer and storm sewer inspection forms are currently not finished, but they are expected to be done before 2008.

The Boone County Fiscal Court's Public Works department also possesses GBA modules (Work Order and Pavement Management), but the GIS Services Division has yet to plan for the integration with their system.

ILEADS/CAD

The mapping of the ILEADS/CAD crime data was a one-time compilation and lacks the real-time currency necessary for public safety activities. Complicating this integration is the fact that the ILEADS/CAD system is based on Intergraph technology – a competitor of ESRI in the geospatial software marketplace.

PVA

The PVA has recently procured a new Computer Aided Mass Appraisal (CAMA) system which will need to be integrated with the GIS. The implementation of this system is literally going on as this strategic plan is being developed, so very little is currently known to assess the prospects for integration.

School Districts

Both School Districts are required to use software mandated by the State of Kentucky's Department of Education, which has just recently been revamped. The GIS Services Division knows little about STI, which prevents any attempts at real-time integration.

The Boone County School District's Transportation Department uses a non-ESRI based system that presents unique challenges and has results in duplication of effort in the past.

Third Party GIS Solutions

In the past, asking the GIS Services Division to build custom GIS applications seems to have been the first option, rather than seeking to procure commercially available third party solutions. This strategic plan wishes to encourage consortium members to reconsider this and instead view third party solutions as a viable choice to satisfy an agency's GIS needs. Such solutions are often better suited to satisfy end user's demands because the provider of such systems can better focus on maturing their system into something that fulfills specific functionality targeted to specific business functions. Additionally, third party solutions often include support and software maintenance which alleviates some of the long-term burden taken on by the GIS Services Division. Likewise, implementations of third party solutions usually involve a regimented implementation plan with a timeline and associated milestones that are overseen by the solution provider. The GIS Services Division should undoubtedly be involved in any project involving integration with Boone County's GIS system, but they should be expected to support the implementation rather than both create and implement the system from scratch.

Integration Priorities

Because of the time that it normally takes to work on systems integration projects, the GIS Advisory Board should be involved with reviewing systems integration priorities and approving any third party systems implementations that have GIS integration requirements. Within this context, agencies pursuing such systems must play the role of project managers with the GIS Staff merely providing a support role.

Challenges

System Design Characteristics

Third party applications and/or their data that are not based on modern open source and interoperability standards may pose significant difficulties in integrating with Boone County's GIS. During the selection of these systems, a key consideration should be the system's ability to easily integrate with ESRI-based GIS data. Antiquated languages that often fall under the heading of "mainframe systems" do not easily lend themselves to real-time integration with ESRI-based data storage formats and application architectures. Choosing third party solutions that have a built-in mapping module which is based on ESRI technology greatly increases the chances for successful integration with Boone County's GIS.

Integration Priorities

As stated above, many agencies have their own IT systems that might be procured from external companies or built internally by agency staff. Agencies that request the GIS Services Division to integrate their system with the GIS often incorrectly assume it to be an

easy task. The Advisory Board should play a role in reviewing and prioritizing these requests to ensure that the GIS Services Division does not over-commit.

Opportunities

GBA

The momentum gained during the efforts to integrate the GBA system with the GIS must be continued. Once the sanitary and storm sewer ArcPad forms have been completed, they should be deployed to the Sanitation District #1.

Efforts to standardize the data schema and content between the City of Florence's Public Services department and the Sanitation District #1 should also be pursued.

ILEADS/CAD

The real-time nature of the work performed by fire department officials and police officers will most likely require a large scale implementation of a third party solution. Support and funding will need to be sought from the major players in the police and/or fire organizations in Boone County.

PVA

The Boone County PVA is ambitiously increasing their technology capabilities by procuring a CAMA system. Parcels are arguably the most used (and thus most important) layer, so integration with the CAMA system will be a high priority in the near future.

School Districts

In 2005, the GIS Services Division researched the cost associated with the Boone County School District purchasing a site license. A site license would allow the School District to not only use the high-end ArcGIS Desktop software to perform all of the analysis and special projects that they currently look to the GIS Services Division to perform for them; but it would allow them to use ESRI software for teaching in all of their schools. The potential to enhance the operations of an already stellar school district while providing students with real world skills in one of the fastest growing and most diverse technologies around should be pursued.

County Clerk

The Boone County Clerk's system continues to pose challenges to the GIS due to it being based on a proprietary language with strict access restrictions. The best chance for near term integration with the Clerk's office would be to link up to a document imaging system that could allow the deeds, plats and other scanned documents to be accessed from within Boone County's standard GIS interface.

System Design Framework Characteristics

Making sure that all systems (both non-GIS and Geospatially-enabled applications) stay current with advances in technology and sound data management practices will serve to position the GIS program for flexibility and interoperability; and ultimately contribute to successful integration initiatives. The GIS Services Division and the Advisory Board should add this to their list of talking points to ensure that consortium agencies recognize the value.

Power Users

IT systems do not exist for all activities carried out by an agency. Yet many of these activities could be improved or enhanced by using GIS technology. The power user concept endorsed by this plan, which would involve the purchasing and training of certain agency staff in ESRI's ArcMap, may well satisfy the agency's GIS needs without requiring the construction or procurement of IT systems that might require integration with the GIS. In order to accomplish this objective, the GIS Services Division must engage power users on a

deeper level and help them to understand how GIS can be used as just another tool in their technology toolkit.

Staffing

<div align="center">**Strengths**</div>

GIS Services Division

    The GIS program in Boone County is fortunate to have a very talented and dedicated staff in the GIS Services Division. There is exceptional chemistry among the staff members within the Division. The ability to support such a large number of users with thick client installations is a testament to the work ethic and competency of the GIS Services Division. Solid relationships have been formed with other IT staff employed by consortium member agencies. The staff is frequently put in positions that require creative thinking to solve problems. It is rare for the Staff to fail at such challenges. The staff has managed to successfully implement complicated software without the typical training regimen seen with many other GIS programs.

Power Users

    The GIS program has somewhat begun the process of building a power user base throughout the consortium. The Boone County GIS consortium currently manages the following ArcMap licenses: eight single-use licenses of ArcView deployed in the Boone County Planning Commission, one concurrent-use license of ArcView at the Boone County Sheriff's Office, and six concurrent-use ArcMap licenses (five ArcView, one ArcEditor) at the City of Florence. Additionally, the Sanitation District #1 has a significant ArcMap user base, as does the Boone County Conservation District. The Northern Kentucky Independent Health District and the Tri-County Economic Development Corporation possess ArcMap seats as well.

<div align="center">**Weaknesses**</div>

GIS Services Division

    As the total number of users increase (see Figure 2), a corresponding increase in staffing is usually necessary to continue the same level of support. The management and upkeep of thick client applications such as BooneMap Classic and BooneMap Lite take up much of the Division's time and energy.

Power Users

    With the increased deployment of ArcMap, many GIS functions can now be performed by member agencies' power users. This change results in an additional responsibility for the GIS Services Division to train and support these power users. To date, there is no formal orientation and training program in place to see that this responsibility is fulfilled. This isn't to say that the GIS Services Division is not addressing the issue; it is merely meant to suggest that a regimented plan for the inculcation of advanced GIS software should be in place.

<div align="center">**Challenges**</div>

GIS Services Division

    Blindly committing to serve additional users could have a negative impact if done without regard for staffing needs. Likewise, blindly committing to projects without regard for the staffing necessary to see it to completion could have a similar effect. It is also risky to commit GIS Services Division staff to carrying out projects based on software in which they have had no training. As the number of GIS users grows, the BCPC will need to closely

watch the effect that such growth has on the GIS Services Division resources and consider the addition of personnel.

Power Users

After an initial battery of training, power users will be expected to carry out many GIS activities on their own. Most people would agree that some people simply aren't cut out to work with computers. Power users must be the type of people who are not skeptical or afraid of technology. Instead they should be the type of person that believes that computers and technology are going to improve their work and make their job easier. Getting the key decision makers at each agency to appoint the right person as their resident power user will be critical to the success in implementing the power user strategy.

Agency Personnel (Non-Power Users)

In today's society, a competent digital workforce is becoming a critical success factor for most public agencies. It is vitally important that each agency commit to hiring employees who are comfortable with computers. Likewise, each agency should commit to training these employees in using computers. The BCPC often finds itself in a conflicting position of needing member agencies to employ end users that are comfortable working with computers, yet the BCPC has limited ability to compel agencies to factor this into their hiring decisions.

Opportunities

GIS Services Division

Equipping power users with appropriate software and empowering them to begin performing advanced GIS functions for themselves will diminish the current strain on the GIS Services Division and minimize the need to increase their staff in the near future. As power users combine their knowledge of their agency's workflows with the capabilities of high-end GIS software, they will discover new ways to use GIS to improve their job functions that otherwise may not have been as apparent to the GIS Services Division.

Power Users

One of the major goals endorsed by this plan is the creation of power users within each agency. Since staff who are employed by the agency have a much clearer understanding of the activities taken on by the agency, these staff should be able to use GIS to assist with the activities in a much more efficient manner. There are likely many questions or problems that GIS can help an agency resolve; but because the GIS Services Division is not as immersed in the agency's business, it is unlikely that the GIS Services Division would be aware of such issues. GIS power users who work at agencies day-in and day-out provide the best opportunity for an agency to leverage geospatial technology targeted to their business needs.

ArcGIS Desktop

Strengths

ArcMap

ArcGIS Desktop contains a desktop application – ArcMap, which is ESRI's current premier product for editing GIS data as well as performing advanced query and analysis. ArcGIS Desktop comes in three different licensing levels providing varying degrees of functionality. Currently, Boone County manages five ArcInfo licenses, one ArcEditor license, and fourteen ArcView licenses. The GIS Services Division use the most current version (9.2) of ArGIS Desktop and have moved completely away from the ESRI's two main legacy applications – ArcInfo Workstation and ArcView 3.x.

BooneMap Workstation

    The GIS Services Division has produced an extension that runs inside of ArcMap and is designed specifically to work with Boone County data. This extension assists users in performing common requests, streamlines and organizes querying capabilities, and provides advanced tools that expedite fulfilling requests for printed maps and digital data.

Weaknesses

ArcMap

    Many BooneMap users incorrectly assume that the functionality that is available to them in BooneMap covers the extent of GIS functionality; when in reality, ArcMap offers a world of additional GIS functionality. Member agencies that wish to take their GIS to the next level must consider the procurement and implementation of higher-end GIS software such as ArcMap. It is incumbent upon the BCPC and GIS Services Division, and the Advisory Board to erase the perception that GIS is only a tool for zooming in and out, panning around, and identifying map features. The creation of power users at each agency will help achieve this goal.

BooneMap Workstation

    The ArcMap extension created by the GIS Services Division has been deployed to the Boone County Planning Commission and the City of Florence. Other agencies that possess ArcMap could benefit from this extension as well. The GIS Services Division should plan for the deployment of BooneMap Workstation to the other member agencies that show a willingness to use it.

Challenges

ArcMap (Implementation Planning)

    Because of the complexity and potential costs, an agency that chooses to pursue ArcMap integration into their organization should have an implementation plan approved by the Advisory Board and overseen by the BCPC. Such implementation plans should have clearly articulated goals, benchmarks and milestones. The Advisory Board must recognize the added time and effort required of the GIS Services Division to oversee and administer such implementation plans.

ArcMap (Training)

    The functions offered by ArcMap can be overwhelming, and they range from the mundane to the extremely complex. The Advisory Board must insist on formal training for power users employed by any agency that chooses to take their organization to the next level by implementing ArcGIS Desktop.

ArcMap (Cost)

    ArcGIS Desktop is not inexpensive. Depending on the licensing level needed, the cost can range from $1200 to $7500 per seat. Additionally, each seat incurs a yearly maintenance fee that must be paid in order to receive software updates.

Opportunities

Power Users

    The power user strategy that is endorsed throughout this strategic plan involves the addition of ArcMap seats for each power user. Wherever possible, concurrent-use licenses should be acquired to minimize overall cost. For power users who work for agencies that are not on the Fiscal Court's network, a hosted services model using technologies such as Citrix may need to be employed.

GIS Services Division Resources

Increasing the number of power users and providing them with ArcMap will help the program in several ways. The most obvious benefit will be that the agencies and departments will possess advanced mapping and analysis capabilities internally that can be used to fit their specific workflows and business processes. The other benefit will be to minimize the need to grow the GIS Services Division staff to deal with the increased workload that is expected in the coming years. This will keep operations costs for the Planning Commission in check while allowing each agency to be more in control of their level of GIS integration.

Strategic Partnerships

Strengths

Regional Relationships

The program's presence extends beyond Boone County. The GIS Services Division has relationships with other GIS programs ran by nearby local governments. Existing relationships to local and regional agencies include the Northern Kentucky Area Planning Commission (NKAPC), the Ohio Kentucky Indiana Regional Council of Governments (OKI), the Cincinnati Area Geographic Information System (CAGIS), the Northern Kentucky Area Development District (NKADD) and Dearborn County Indiana.

State Relationships

The State government is noted for having an exceptional GIS program and Boone County's GIS Services Division has an established dialogue with the State government's Division of Geographic Information (DGI).

Federal Relationships

Relationships of varying degrees exist with some federal agencies including the United States Geological Survey (USGS), Natural Resources Conservation Service (NRCS) and the United States Census Bureau (USCB).

ESRI Relationship

Boone County's GIS program is undoubtedly an "ESRI shop". Boone County's relationship extends back to the program's beginning in 1993. The GIS Services Division has worked hard recently to improve the communication with ESRI representatives.

Inter-Agency IT Relationships

The GIS Services Division has a very solid relationship with the Boone County Fiscal Court's Information Services department, who maintains all of the network resources, most of the hardware and much of the software used by the BCPC and GIS Services Division.

The City of Florence has embraced a cutting edge IT service delivery model based on the new virtualization paradigm. The GIS Services Division has successfully worked with the City's Information Technology department to deploy BooneMap within their virtualization framework.

Weaknesses

ESRI Relationship

There exists a great deal of potential for improving the relationship with ESRI. ESRI has a track record of engaging successful programs as a way of promoting their software in the marketplace. Boone County is striving to be viewed by ESRI as a progressive GIS that marches in step with their company's offerings.

Challenges

Existing Member Relationships

Keeping users engaged is always challenging. Appropriate attention must be paid to nurture the relationships that have already been established with participating agencies and ensure their satisfaction with the program.

Priorities

In today's world, government agencies are often asked to do more with fewer resources. Within this context, activities aimed at fostering relationships with other agencies are often perceived to provide little benefit while detracting from the business of taking care of Boone County's priorities. This section's focus on building relationships may therefore be considered a secondary priority, taking a back seat to the day-to-day activities that yield tangible benefits to the citizens and businesses in Boone County.

Opportunities

Regional Relationships

Boone County GIS program has received a fair amount of attention related to its recent geodatabase implementation efforts. The GIS Services Division has automated procedures in place that could assist nearby GIS programs in easily adopting Boone County's geodatabase model. Efforts to establish data standards could result in numerous benefits to the region. With the GIS Services Division's experience in application development, Boone County could work with other regional agencies to establish standard applications and web interfaces.

State Relationships

Regarding Boone County's ArcSDE implementation, the GIS Services Division has stayed focused on vector data and is just beginning the process to load its raster data into ArcSDE. The state DGI has staff whom are considered experts in ArcSDE raster data. The relationship with DGI should be leveraged to assist Boone County in loading its raster data holdings into ArcSDE.

Federal Relationships

Boone County's relationship with federal agencies has been limited to data sharing. However, federal initiatives such as the National Map and the National Spatial Data Infrastructure (NSDI) involve efforts at setting data standards and deserve more attention from Boone County. Boone County should look to the state DGI for help with adopting these standards.

Inter-Agency IT Relationships

The GIS Services Division needs to leverage the existing relationships with the BCFC's Information Services department for assistance with the possible implementation of Citrix technology. The GIS Services Division can also learn from the City of Florence's virtualization efforts to determine if this new service delivery paradigm could benefit the consortium.

Additional Consortium Membership

Although the Boone County GIS consortium is involved with nearly every public organization in Boone County, there are still a few agencies focused on Boone County that could be brought into the mix. Invitations to join the consortium should be extended to these agencies.

Existing Member Relationships

For existing member agencies that carry out job functions that relate to growth and development in the county (i.e. the PVA, County Clerk, Building Department, and Public

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Works), encouraging greater participation in the data development process will create a stronger feeling of ownership of the data and connection to the program.

Peer Reviews

Peer reviews and objective constructive comparisons with other successful programs nearby should be pursued to enforce best practices, promote awareness of successful trends, and foster regional cooperation.

Accountability

Strengths

Partner Composition

Due to the nature of how Boone County GIS is organized and managed, accountability is not an issue. The Boone County GIS Partnership represents the four legislative units and the Planning Commission. Boone County GIS is accountable to the Boone County Fiscal Court and the Cities of Florence, Union and Walton just like the Planning Commission. GIS work is reported to the Boone County GIS Advisory Board on a quarterly basis, along with financial reports. All revenue and expenditures are included in the Planning Commission's fiscal year budget and annual audit. The agency's annual audit is forwarded to each legislative unit. All GIS contracts with agencies and vendors are approved by the full membership of the Boone County Planning Commission.

Weaknesses

Member Assessments

Each agency that participates with the Boone County GIS consortium is annually assessed different amounts. The financial assessment formulas used in 1993 to determine contribution amounts were based upon the original GIS Implementation Plan. Agencies were assessed based upon anticipated needs and use of the overall system. A follow-up formula assessment with some agencies is needed to assure that equity occurs with costs and benefits. This again would be based upon the GIS needs of the organization and the use of the data by each agency. It would also include the value of data sets to each organization and continued technical assistance.

Assessments and Cost-Benefit

The amount of time that the GIS Services Division spends on each activity is not currently tracked by the BCPC. Because some of their work is routine in nature and yields benefits to all consortium members (e.g. upkeep of enterprise layers such as parcels and road centerlines, and acquisition of new aerial photos); yet other activities are project-oriented with a definite start and end date, it becomes complicated to attempt to associate the amount of each agency's assessment to the amount of benefit they receive.

Project Oversight

Even though the GIS Advisory Board is kept apprised of the GIS Services Division's work activities every quarter, no formal project proposal and approval process currently exists for the Division's work activities. Likewise, there is nothing currently in place to routinely inform member agencies of the activities being worked on by the GIS Services Division.

Challenges

Member Assessments

Some agencies have grown accustomed to a static amount charged each year. Raising their contribution amounts may require a concerted effort to convince these agencies of the need for such a change

Assessments and Cost-Benefit

Justifying the contribution amounts assessed annually to member agencies may likely involve the implementation of a new computer system to track the time spent on GIS Services Division activities. To avoid draining valuable staff time, this system must be efficient and easy to use, but it must also be refined enough to provide detailed information regarding resources assigned to projects.

Project Oversight

The bi-monthly meetings suggested below could result in more work for the GIS Services Division. It is highly recommended that if the consortium partnership endorses the idea of such a meeting, then the project governance procedures suggested herein must also be endorsed to avoid the possibility of over-committing to an excessive workload.

Opportunities

Member Assessments

This strategic plan is a prime opportunity to address equity concerns relating to member assessments.

Assessments and Cost-Benefit

Tracking the time spent on work activities could have positive benefits relating to accountability. The BCPC and Advisory Board can better manage the GIS Services Division as the allocation of staff time will be apparent. Such a system could be leveraged to support the need for increasing or decreasing annual assessments.

Project Oversight

Considering the number of projects carried out annually and the fact that the amount of effort needed to carry out different projects varies, the BCPC should have a project governance process in place to review, approve and prioritize the GIS Services Division's activities. A project governance procedure will go a long way towards satisfying many of the needs for increased accountability. Such a process should include a post-mortem report detailing the activities that were undertaken and the amount of time and money that was used to achieve the end results.

Additionally, a bi-monthly meeting (six times a year) for all members in which routine reports of work progress for all agencies will be disseminated could be pursued. This type of meeting will help to further the feeling that all members are part of a larger team, provide a networking opportunity for agency staff to discuss inter-agency collaboration, and inform members of the greater potential of geospatial technologies.

Organizational Model

In order to keep all member agencies informed of the work being done by the GIS Services Division, the partnership may consider adopting a different organizational model that utilizes many committees focused on specific aspects of the system (i.e. Mobile Mapping, Utilities, Public Safety, etc.). This may serve to better engage users while maintaining a higher level of accountability for the GIS Services Division.

Financial Security

Boone County GIS has a diverse source of funding. This funding model is unique to similar GIS systems in the region. Boone County GIS is funded by 5 Partners, 20 Contributing Members and 6 Subscribers. It also has received federal grants in the past from USGS to offset the cost of certain projects. Even though Boone County GIS has 31 different funding sources at various contribution levels, it also has agreements with agencies that don't contribute financially but expect a certain level of services and access to the data. This includes 6 Data Sharing Affiliates and 4 non-financial members. In FY 2006-2007, Boone County GIS generated $434,442 in revenue. Approximately 61% of the funding for Boone County GIS originates from the Partners, while the remaining amount is attributed to the Contributing Members, Subscribers, GIS sales and grants. Below is a five-year history of income and expenses associated with Boone County GIS.

	Income	Expenses	Difference
FY 2006-2007	$434,442	$434,593	($151)
FY 2005-2006	$384,127	$390,335	($6,208)
FY 2004-2005	$371,875	$359,964	$11,911
FY 2003-2004	$373,650	$326,166	$47,484
FY 2002-2003	$370,657	$336,701	$33,956

Weaknesses

Non-Annual Costs

The funding model currently in place does not account for non-routine costs for aerial photography, digital terrain and topography updates, and specialized hardware purchases such as plotters. These costs have typically been funded via special assessments.   Funding critical non-routine costs when they arise carries with it a degree of uncertainty regarding how much an agency should budget yearly.

Personnel Costs

In addition, the Planning Commission does not charge an administrative cost to manage Boone County GIS. This includes an amount for staff salaries and benefits of other non-GIS employees and other office equipment. In FY 2006-2007, this amount was approximately $46,911. GIS revenue generated is applied to the salaries and benefits for 5 employees, equipment, software licenses, training, etc. Further, the costs associated with retaining a qualified GIS professional staff are increasing as a result of health insurance and retirement costs.

Challenges

ArcGIS Desktop

Agreeing to the concept of power users that utilize higher-end GIS software will incur both short-term and long-term costs for the purchase of additional seats of ArGIS Desktop.

GIS Services Division Training

Training funds may need to be increased to ensure an appropriate level of training for the GIS Services Division staff in ESRI technologies (SDE, ArcObjects, ArcGIS Server) as well as other professional level training (Visual Studio, C-sharp, SQL Server).

Power User Training

For power users to be truly empowered to achieve the goals articulated within this plan, they must be provided with formal instruction by ESRI instructors in the use of ArcGIS Desktop.

<div align="center">

Opportunities

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Non-Annual Costs

Establishing a special fund in which a portion of each agency's annual contribution would be set aside to cover non- routine costs would perhaps be a more stable and reliable strategy for funding necessary non- routine items.

Member Contributions

Elected officials and other decision makers could study the current funding model and attempt to determine a more reliable and stable model for annually funding the operations of the GIS program.

Recognition/Public Relations

<div align="center">

Strengths

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Awards

Through networking and participation with local and regional user groups, state user groups and conferences, and national conferences, Boone County's GIS program is gaining increased recognition as a quality GIS. This recognition includes an award in 2006 for Exemplary System and an award for Best Map at the state GIS conference.

Conference Participation

The GIS Services Division has maintained a significant presence at the state GIS conference. In the last four state conferences, members of the GIS Services Division has presented in twelve sessions. The Division's Director also presented at the 2007 ESRI International User Conference.

Published Articles

The GIS Services Division has had an article published in the February 2005 edition of a nationally distributed periodical – *Geospatial Solutions* that dealt with data standards. The GIS Services Division also received recognition in 2007 by having the award winning Arboretum map published in the 22nd annual ESRI Map Book.

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Weaknesses

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Recognition Efforts

The GIS Services Division does not focus much time pursuing awards and recognition. The program has adopted the attitude that our results speak for itself which works fine if your audience is internal to Boone County. However, there are positive benefits for Boone County and its GIS consortium members to seeking recognition outside of Boone County.

ESRI Recognition

The GIS Services Division would also like to pursue a closer relationship with ESRI with more frequent visits from account representatives and increased correspondence with other technical experts.

<div align="center">

Challenges

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Priorities

Rarely is there a lull in the amount of work for the GIS Services Division, so actually taking the time to think about public relations and marketing the program, or to prepare a journal article for submission may be a challenge unto itself. Time spent on promoting the

program's accomplishments may be viewed by some as time taken away from Boone County's priorities.

<div align="center">Opportunities</div>

Awards

There are several established awards that Boone County's GIS program could be considered for. The program should attempt to submit award applications to URISA, GITA and ESRI.

Conference Participation

A continued presence at the state GIS User Conference and an increased presence will be sought at the ESRI International User Conference and local user group meetings.

Published Articles

Getting articles published in periodicals is a good way to garner some attention. If the Project Summaries (see below) could be submitted to journals or organizations such as URISA in an attempt to have Boone County's work published nationally. The Kentucky Association of Mapping Professionals also has a quarterly newsletter that could help promote Boone County's GIS program within the Commonwealth.

ESRI Recognition

In order to gain more recognition from ESRI, the GIS Services Division should try and get accepted into ESRI's beta-testing program. Additionally, increased interaction with ESRI technical experts on pressing issues may help prove to ESRI that Boone County has a system worth touting to their other clients.

Project Summaries

The project governance process that is proposed in this strategic plan suggests the creation of project post-mortem reports. These summaries could be published to the GIS website to inform the public and other GIS programs about the work being done by the GIS Services Division.

Standards Initiatives

Involvement with standard-setting initiatives at the state and federal level will also be a good mechanism to increase exposure for Boone County.

Advisory Board

<div align="center">Strengths</div>

In 1996, the Boone County Planning Commission, along with the Boone County Fiscal Court and the Cities of Florence, Walton and Union, formed a partnership agreement to create Boone County GIS. This partnership agreement identified the above entities as partners to organize and manage Boone County GIS. It also prescribed that Boone County GIS be managed by the Boone County Planning Commission in its daily operations. It also created a Boone County GIS Advisory Board.

The purpose of the Boone County GIS Advisory Board is to provide input on the management or operation of Boone County GIS. Its role is to advise the Executive Director and the Director of GIS Services of the Planning Commission of technical and operational issues. This can include assisting staff in establishing policies, priorities and funding alternatives. At a minimum, the Boone County GIS Advisory Board is required to meet four times a year. Members of the Boone County GIS Advisory Board are the Boone County Administrator, the Florence City Coordinator, a representative appointed by the Union Mayor and a representative appointed by the Walton Mayor.

The Partnership Agreement specifies GIS responsibilities of each partner. These responsibilities appear below:

a) Contribute monies towards the development of Boone County GIS.
b) Serve as a Boone County GIS Advisory Board member.
c) Provide staff with technical assistance when needed.
d) When necessary, assist in the selection of computer equipment and personnel.
e) Share data.
f) Review annual GIS work program, budget and fees.
g) Assist in setting GIS policies and priorities.

The responsibilities of the Planning Commission involve more of the daily operational tasks. Below is a list of them.

a) Contribute monies towards the development of Boone County GIS.
b) Serve as a Boone County GIS Advisory Board member.
c) Provide office space for the Boone County GIS.
d) Supervise GIS personnel and maintain the computer equipment.
e) Manage all GIS expenses and revenues.
f) Provide storage and printing of GIS products and data.
g) Provide regular updates of GIS to its partners, members and the public.
h) Provide other staff assistance when needed.
i) Purchase computer equipment and hire appropriate personnel.
j) Prepare annual GIS work program and budget.
k) Assist in setting GIS policies and priorities.
l) Market and sell GIS products.
m) Establish fee schedule for the sale of GIS products.
n) Other GIS related tasks.

Weaknesses

By nature, the purpose of the Boone County GIS Advisory Board is to advise the GIS professional staff. Historically, this purpose has been fulfilled as Boone County GIS has evolved and grown in the last 10 years. However, in the last two years, it seems that the effectiveness of the Advisory Board had diminished because of low attendance at meetings. This could be the result of complete satisfaction with the operation of the program or it could mean that there are other priorities with Advisory Board members.

Challenges

Since Boone County GIS has completed its "start up" phase and is now operating in a more mature phase or stage, it is critical to have the partners fully engage in the future direction of the county-wide system. This includes being supportive of technological advances, full deployment and application of GIS within their own organization and playing a role in future funding initiatives based upon priorities and an expanded workload as outlined in the Strategic Plan.

Opportunities

This Strategic Plan evaluates the past and current operations of Boone County GIS. It also identifies Program Strategies in the areas of Quality Service Delivery in Real Time, Best

Practices in GeoData Management, Systems Integration, Strategic Partnerships, User Engagement, User and Staff Development, Program Documentation, Project Governance, Prioritization and Decision Rights, and Program Recognition. Goals are identified to make Boone County GIS more productive, efficient and self-sustaining. In addition, Objectives and Initiatives have been formulated pertaining to Administration, Technical Architecture, Systems Integration, User Empowerment and Cartography. Recommendations from the Strategic Plan will be integrated in the Boone County Planning Commission's Annual Work Program prepared by the Executive Director with assistance from the Director of GIS Services.

IV. STRATEGIC PLAN

Program Strategies

Quality Service Delivery in Real-Time
To combat the increasing number of users and minimize the subsequent need to increase the
Planning Commission's GIS staff, all standard applications will be migrated to newer
technologies (Internet, Terminal Services, Citrix, Mobile Connectivity, etc.) that are more
conducive to efficient GIS service delivery within the context of the program's current
technical architecture. These technologies will also result in real-time data updates for end
users. Constant monitoring of the system performance will be necessary to ensure user
satisfaction.

Best Practices in GeoData Management
The GIS Services Division will focus on GIS data management practices that are widely
accepted as both efficient and wise. The GIS Services Division will continue to refine its
prior implementation of the ESRI concepts of geodatabase data storage, versioning,
geodatabase topology and domain table validation. Data custodianship will be transferred to
agencies that express an interest and agree to an implementation plan developed jointly by
the GIS Services Division and the agency, and approved by the Advisory Board.

Systems Integration
To combat the challenge of integrating the GIS applications and/or data with other systems
used by various agencies, staff will maintain the GIS in a flexible manner that will support
interoperability with other systems. This requires the GIS to be built on widely accepted
technologies and modern, common languages. Consortium members will involve the GIS
technical staff in any decision or procurement process aimed at acquiring information
systems that will be expected to interface with the GIS.

Strategic Partnerships
The BCPC will promote the team concept of the GIS program and nurture the relationships
with consortium members. Appropriate attention will be paid to fostering productive
dialogues with other local, regional, state and federal GIS programs. Attempts to solidify a
closer relationship with ESRI will also be pursued.

User Engagement
In recognizing that the GIS program is service oriented in nature, the GIS Services Division
will actively work on cultivating a thriving user base.   Improved communication will be
achieved via increased correspondence and targeted user groups and/or committees. A major
change resulting from this strategic plan will be the formation and empowerment of a group
of end users designated as power users.

User & Staff Development
The current training curriculum offered by the GIS Services Division will be improved and
expanded. A GIS orientation will be offered to any new employee of consortium members.
Power users will be equipped with ArcMap and provided professional training in ArcMap.
The GIS Services Division will also be properly trained to deal with the frequent
improvements to ESRI technology.

Program Documentation

The program will develop a succession management program that will ensure business continuity upon the departure of key personnel. Comprehensive documentation of critical system components will be created and maintained.

Project Governance, Prioritization and Decision Rights

A formal process of reviewing, approving and documenting all aspects of long-term projects and other projects of significance will be adopted by the Advisory Board. The procedures will include a scope and approach proposal that will list of resources needed to successfully complete the project. The procedures will also include a project post-mortem report to summarize the results of the initiative.

Program Recognition

Boone County will aggressively pursue activities aimed at increasing recognition of the GIS program. This will include presentations at conferences and journal article submissions. A more aggressive attitude regarding press releases announcing Staff achievements and work activities will also be adopted by the BCPC.

Goals

I. Implement the Best Possible System Architecture for Boone County.

II. Form a Diverse Group of Power Users Comprised of Staff Employed by Member Agencies.

III. Create an Internet-Based GIS Viewing Application to Replace all Locally Installed Thick Client Versions of BooneMap.

IV. Adopt Project Governance Procedures and Associated Policies with Oversight and Decision Rights Assigned to the Advisory Board.

V. Integrate the GIS with Other IT Systems Used by Member Agencies.

VI. Thoroughly Document all Aspects of the Program.

VII. Empower Users and Increase the Member Agency's Sense of Ownership in the System

VIII. Create and Fund a Training Plan for the GIS Services Division and Power Users.

IX. Add One New Staff Member to the GIS Services Division to Fulfill ArcSDE Administration and Systems Analyst Needs.

X. Increase Exposure for Boone County and the GIS Consortium Members by Promoting the GIS Program.

Objectives & Initiatives

The following codes to the left of the 'START' column indicate the frequency with which the activity is to be pursued.

- A = Annually
- S = Semi-Annually
- Q = Quarterly
- B = Bi-Monthly
- M = Monthly
- W = Weekly
- D = Daily
- X = Upon Request/As Needed

The roman numeral(s) in parentheses at the end of each Objective refers to the goal(s) identified on the previous page that the Objective will help achieve.

Administration

1. Develop a different budget process to adequately fund operational costs for Boone County GIS in the future (VI)	START	END	PREREQUISITES
A. Complete an assessment of contribution levels from partners, contributing members, subscribers, grants, etc. to determine their adequacy for existing and future operations.			
B. Prepare a 3-year budget of anticipated revenue and costs based upon anticipated work and program priorities.			
C. Formulate a 3-year funding campaign to meet program needs – staffing, equipment, special projects, training, etc..			

2. Formulate Process Whereby the Addition of New Members are Evaluated (VI)	START	END	PREREQUISITES
A. Identify membership goals and potential future member agencies.	9/2007	10/2007	None
B. Research the primary business functions and potential GIS benefits for each identified agency.	10/2007	11/2007	None
C. Make contact and pursue conversations with key decision makers at each identified agency.	A 11/2007	Continuous	None

3. Adopt Project Governance and Prioritization Procedures, and Outline Decision Rights (IV)		START	END	PREREQUISITES
A. Create a standard Scope and Approach document that will be used to propose major projects to the Advisory Board which require a significant amount of resources.		7/2008	8/2008	None
B. Develop a priority system that will serve to guide the allocation of staff resources to ensure appropriate oversight and timely completion of major projects.		8/2008	9/2008	None
C. Devise a system for routinely reporting the status of major projects to Advisory Board members.		9/2008	10/2008	None
D. Develop a standard form for detailing the results of major projects (for each project, a two to three page summary will be written that will be published on the website and submitted to journals and periodicals in hopes of gaining exposure for the GIS program).		10/2008	10/2008	None

4. Cultivate Beneficial Relationships with Reputable GIS Programs and the Geospatial Vendor Community (X)		START	END	PREREQUISITES
A. Formulate a vision statement regarding how the consortium wishes to be perceived among peers in the GIS community, ESRI, and other vendors.		11/2007	11/2007	None
B. Identify conferences, seminars, user groups and other networking opportunities for staff and users to engage in.	Q	11/2007	12/2007	None
C. Open up communication with the State Division of Geographic Information by inviting their staff to participate in a peer review of our system.		1/2008	2/2008	Objective #13

5. Increase Program Exposure (X)		START	END	PREREQUISITES
A. Identify opportunities to promote the program with the local media outlets.	A	Continuous		None
B. Research organizations involved in setting standards and seek out ways to get involved.	A	Continuous		None
C. Continue presenting at conferences, seminars and user groups.	A	Continuous		None
D. Develop cost estimate and secure funding.	A			

		START	END	PREREQUISITES
6.	Establish a Set of Statements to be Used to Promote an Understanding of the Basic Expectations of Consortium Members (VII)			
	A. Develop talking points relating to basic philosophical pre-requisites for participating with Boone County's GIS program.	12/2007	1/2008	None
	B. Promote these ideas at the annual user group meetings.	A 5/2008		None

		START	END	PREREQUISITES
7.	The Policies, Procedures and Tools Relating to the GIS Fee Schedule and Data and Map Requests will be Reviewed and Revised (VI)			
	A. Perform a critical review of the current fee schedule.	A 6/2008	6/2008	None
	B. Perform a critical review of the current data and map request forms.	A 6/2008	6/2008	None
	C. Present proposed changes to the Advisory Board for discussion and subsequent approval.	A July meeting		Changes suggested
	D. Review of the current application tools and adjust them according to approved revisions to the fee schedule and/or request forms.	A Timeline varies (generally plan at least 1 month)		Revisions approved

		START	END	PREREQUISITES
8.	BooneCountyGIS.com will Undergo a Critical Review and Implement Changes to Ensure that the Website Remains Fresh and Useful (X)			
	A. GIS Services Division will perform a critical review of the current website.	A 6/2008	6/2008	None
	B. Advisory Board members will perform a critical review of the current website.	A 6/2008	6/2008	None
	C. Advisory Board and GIS Services Division will meet to discuss potential changes to website.	A July meeting		Changes suggested
	D. Agreed upon changes to website will be implemented by GIS Services Division.	A 8/2008	8/2008	Revisions approved

		START	END	PREREQUISITES
9.	Project Summaries will be Published on BooneCountyGIS.com (X)			
	A. Publish project summaries on the website.	Continuous		Upon project completion
	B. Announcements section on homepage will be updated to announce that a new project has been completed.	Continuous		As project summaries are approved

10. A System will be Created to Track the Resources Spent on Projects (IV)		START	END	PREREQUISITES
A. Document the different frequencies of work activities (ongoing, recurring *<monthly, quarterly, annually>*, one-time, etc.) and activity categories (data, map production, application, user support, administration, etc.).		7/2008	9/2008	None
B. BCPC will construct system to track resources used for GIS Services Division activities.		9/2008	11/2008	None
C. Create standard reports to be generated and provided to Advisory Board members on a routine basis.	Q	Due at Advisory Board meetings		None

11. A Process for Turning Over the Custodianship of GIS Layers to Members will be Established (I, II, IV, V, VII)		START	END	PREREQUISITES
A. Identify the most logical custodians (agency *and* staff) to manage updates to information contained within GIS datasets.	A	3/2008	3/2008	None
B. Evaluate the agencies to determine who is best equipped and capable to handle data maintenance activities.	A	3/2008	7/2008	None
C. For each agency that desires to pursue it, an implementation proposal will be submitted to the Advisory Board for consideration.	A	July meeting		None

Technical Architecture

12. Upgrade and Improve Servers/System Architecture (I, III)	START	END	PREREQUISITES
A. Re-size BCFCIMS and Re-build to BCGISFILE using Windows Server 2003 OS.		Completed	BCFC IS resources
B. Re-build BCFCAGS to BCGISIMS using Windows Server 2003 OS, ArcIMS 9.2 and ArcGIS Server Enterprise Standard 9.2.		Completed	BCFC IS resources
C. Re-size BCFCGIS and Re-build to BCGISSDE using Windows Server 2003 OS, SQL Server 2005 and ArcSDE 9.2 (ArcGIS Server Enterprise Basic).		Completed	BCFC IS resources
D. Develop cost estimate and secure funding			

13. A Second (vector) and Third (raster) ArcSDE Instance will be Created and Utilized for Standardized Published Data (I, III)	START	END	PREREQUISITES
A. Construct schema creation script.	1/2008	2/2008	None
B. Build ArcSDE 'pub' and 'ras' geodatabases	2/2008	3/2008	Schema creation script
C. Build data transformation models for pub gdb.	3/2008	5/2008	Pub GDB exists
D. Test, debug and refine data transformation models.	5/2008	6/2008	Models exist
E. Create scripts to automate data publishing.	6/2008	7/2008	Objective 19C

14. A Strictly Regimented Backup, Recovery and Security Strategy will be Devised, Implemented and Documented (I, VI)	START	END	PREREQUISITES
A. Document backup and recovery needs.	7/2008	8/2008	Objective #12
B. Create automated routines and scripts to facilitate needs.	8/2008	10/2008	Objective #19B
C. Test, debug, and refine routines.	10/2008	11/2008	Recent publishing
D. Devise plan for periodic drills to test staffs responsiveness.	S	12/2008 & 6/2009	Backup and recovery routines exists

15. New ArcGIS Server Web Mapping Services will be Constructed Using ESRI Provided Templates to Replace the Pre-Existing ArcIMS Mapping Services (I, III)	START	END	PREREQUISITES
A. Identify ArcIMS services to be replicated.	9/2007		None
B. Determine standard functionality needed.	10/2007		None
C. Build standard prototypes.	10/2007	1/2008	None
D. Test prototypes and seek feedback.	10/2007	1/2008	None
E. Begin phasing out ArcIMS services and promote new mapping services.	1/2008	7/2008	None
F. Re-point data sources for web mapping services to 'pub' geodatabase	7/2008	9/2008	Pub GDB exists

16. Create an Internet-Based Standard GIS Interface for All End Users (I, III, X)	START	END	PREREQUISITES
A. Build standard prototypes for each member agency.	7/2008	11/2008	None
B. Add additional functionality to standard prototypes to mimic functionality found in BooneMap.	11/2008	12/2008	Objective #19D
C. Study agency needs for additional functionality.	7/2009	Continuous	none
D. Incorporate specialized functions and models that are specific to agency needs.	X	Continuous	All steps above

17. Eliminate all Applications Based on the MapObjects Language (I, III)	START	END	PREREQUISITES
A. Identify all existing BooneMap Classic installations and evaluate the workstation specifications for those computers.	8/2009	9/2009	None
B. Create migration plan to replace BooneMap Classic installations with BooneMap Lite.	9/2009	10/2009	None
C. Gain endorsement from Advisory Board to proceed with migration plan.	October meeting		Migration plan exists
D. Carry out migration plan.	11/2009	1/2010	Advisory Board approval to proceed

18. Upgrade Desktop Applications (I)	START	END	PREREQUISITES
A. Upgrade BooneMap Classic and LT to 4.0.1.	Completed		None
B. Upgrade ArcGIS Desktop and BooneMap Workstation.	Completed		None
C. Implement CITRIX technology.	4/2008	4/2009	BCFC IS support
D. Develop cost estimate and secure funding.			

19. Upgrade Mobile Workforce (I, V)		START	END	PREREQUISITES
A. Upgrade all GeoXTs with ArcPad 7.0 and GPS Correct.		Completed		ArcPad 7.0 and ArcPad Studio 7.0
B. Build and deploy ArcPad customizations for sanitary, water and storm utilities.		9/2007	11/2007	None
C. Train utility workforce on ArcPad customizations.	Q	11/2007	1/2008	None
D. Upgrade MDTs to BooneMap LT 4.0.1.		7/2008	9/2008	New MDTs
E. Train police and fire staff on BooneMap Lite.		9/2008	12/2008	None

20. A Staff Development Plan that Supports the Ongoing Improvements to Boone County's GIS Technical Architecture will be Created (I, III, VIII)	START	END	PREREQUISITES
A. A training curriculum for each staff member in the GIS Services Division created.	7/2008	9/2008	None
B. Attend Microsoft SQL Server courses.	9/2008		None
C. Attend Visual Studio courses.	10/2008		None
D. Attend ArcObjects courses.	11/2008		None
E. Attend Python courses.	12/2008		None

	START	END	PREREQUISITES
F. Develop cost estimate and secure funding for each course.			

21. Document Data Management (I, VI, VIII)	**START**	**END**	**PREREQUISITES**
A. Identify the following for each layer: source document; source document projection; custodian – agency and technician(s); production location, format and data definition; publishing location, format and data definition; data transformation procedures, custom editing tools and frequency with which updates occur.	10/2008	7/2009	None
B. Build upon step A and create FGDC compliant metadata for core datasets (parcels, centerlines, structures, addresses, political jurisdictions, contours, hydrography, subdivisions and aerials).	7/2009	1/2010	None
C. Develop a change control process by which changes to dataset characteristics can be requested, reviewed and approved so that business continuity will be uninterrupted.	1/2010	3/2010	None
D. Build upon step A and create FGDC compliant metadata for all other datasets.	1/2010	1/2012	None
E. Thoroughly document routine steps taken to edit datasets.	1/2010	7/2010	None

22. Document Layer File Configurations and MXD Prerequisites (VI)	**START**	**END**	**PREREQUISITES**
A. Compile list of standardized layer files.	10/2008	12/2008	None
B. For each layer file, document the following: source; custodian; storage location; field aliases; symbology; definition queries; label classes with associated symbology; scale thresholds; primary display field; and map tips setting.	12/2008	7/2008	None
C. Establish change control protocols that link alterations to source datasets to affected layer files.	7/2008	9/2008	None

23. Document ArcMap Layout Templates (VI)	**START**	**END**	**PREREQUISITES**
A. Compile list of standardized ArcMap layout templates.	9/2008	11/2008	None
B. For each ArcMap layout template, document the following for all map elements: element type, size and position, source and storage location (for imported pictures); legend configuration and TOC format for each layer; scale bar and scale text settings; and any other parameter that would be necessary to reproduce the layer template if necessary.	11/2008	5/2009	None

C. Establish change control protocols that link alterations to source datasets and/or workflows to the layout template.	5/2009	7/2009	None

24. Document ArcMap Projects (VI)	**START**	**END**	**PREREQUISITES**
A. Compile list of standardized ArcMap projects.	11/2008	1/2009	None
B. For each ArcMap projects, document the following: custodian; storage location; data frame names and layers included with each (reference layer files if possible; if not, then all layer parameters noted above in Task #22 must be documented); status of labels; and layout configuration (per Task #23).	1/2009	7/2009	None
C. Establish change control protocols that link alterations to source datasets and/or layer files to affected ArcMap projects.	7/2009	9/2009	None

25. Document Custom-Built Applications (VI)	**START**	**END**	**PREREQUISITES**
A. Identify the following for each application built by the GIS Services Division: application architecture (language, development environment, etc.); origin; author; development team and roles; programming code with comments; testing history and procedures, version history, production location; detailed installation instructions and user guide.	7/2010	7/2011	None
B. Develop a change control process by which changes to applications can be requested, reviewed and approved so that business continuity will be uninterrupted.	7/2011	1/2012	None

26. Document System Architecture (I, VI)	**START**	**END**	**PREREQUISITES**
A. Design diagram of current system architecture including server tasking, publishing and editor locations, field editing devices and printer/plotter assignments.	1/2008	3/2008	None
B. Create narrative for diagram that details the interactions between various components within the system framework..	3/2008	6/2008	None
C. Develop a change control process by which changes to the system architecture can be requested, reviewed and approved so that business continuity will be uninterrupted.	6/2008	6/2009	None
D. Develop policies for hardware and software standards and replacement.	6/2008	1/2009	None

27. Document and Promote Global Positioning Hardware and Software Standards (I, VI)	START	END	PREREQUISITES
A. Research consortium member functions to determine all potential uses for GPS technology.	7/2010	1/2011	None
B. Identify the accuracy requirements, form factor needs, and other use characteristics for each function.	7/2010	1/2011	None
C. With a focus on limiting the array of choices, research GPS hardware and software products in an attempt to establish specific devices and applications to satisfy each function.	1/2011	3/2011	None
D. If possible, work with consortium members and their staff to test the devices and applications for satisfaction.	3/2011	7/2011	Test machines and software from vendors
E. Document the chosen devices and applications and promote as standards for consortium members.	7/2011	Continuous	None

Systems Integration

28. Refine and Document the Rollover Procedures for PSCC's ILEADS/CAD System (II, V, VI, VII)	START	END	PREREQUISITES
A. Document the geospatial data requirements of the PSCC system, including the responsibilities of each agency and whom within each agency is charged with what tasks.	10/2007	10/2007	Assistance from Intergraph representative
B. Create models that will transform the GIS Services Division's ESRI-based data into the format and schema required by the PSCC system.	11/2007	11/2007	None
C. Establish frequency with which updates must occur and create automation routines to ensure updates are performed at the specified frequency.	11/2007	12/2007	None

29. Integrate the GIS with the PVA System (V, VII)	START	END	PREREQUISITES
A. Perform discovery involving the following aspects of the system: application architecture; basic use of the system (include training if possible); data storage format and location; data mining methods; and the possibility for real-time integration.	10/2007	1/2008	None
B. Outline and prioritize potential ways for the GIS to contribute to the efficiency and routine operations of the PVA office.	1/2008	7/2008	None

C. Develop an integration plan to be approved by the PVA and presented to the Advisory Board.	7/2008	10/2008	None

30. Integrate the GIS with the County Clerk System (V, VII)	**START**	**END**	**PREREQUISITES**
A. Perform discovery involving the following aspects of the system: application architecture; basic use of the system (include training if possible); data storage format and location; data mining methods; and the possibility for real-time integration.	10/2008	1/2009	None
B. Outline and prioritize potential ways for the GIS to contribute to the efficiency and routine operations of the Clerk's Office.	1/2009	7/2009	None
C. Develop an integration plan to be approved by the County Clerk and presented to the Advisory Board.	7/2009	10/2009	None

31. Integrate the GIS with the FireHouse Software (V, VII)	**START**	**END**	**PREREQUISITES**
A. Perform discovery involving the following aspects of the system: application architecture; basic use of the system (include training if possible); data storage format and location; data mining methods; and the possibility for real-time integration.	10/2009	1/2010	None
B. Outline and prioritize potential ways for the GIS to contribute to the efficiency and routine operations of the Fire Departments.	1/2010	7/2010	None
C. Develop an integration plan to be approved by the Fire Chiefs Association and presented to the Advisory Board.	7/2010	10/2010	None
D. Develop cost estimate and secure funding.			

32. Integrate the GIS with the GBA CMMS (II, V, VII)	**START**	**END**	**PREREQUISITES**
A. Integrate Field Activities with GBAMS and Enterprise Geodatabase.	9/2007	?	?
B. Develop cost estimate and secure funding.			

33. Implement the EduLog Shapefile Integration Module (II, V, VII)	**START**	**END**	**PREREQUISITES**
A. Perform discovery involving the following aspects of the system: basic use of the system (include training if possible); data storage format and location; data mining methods; and the possibility for real-time integration.	7/2008	10/2008	Assistance from EduLog representative
B. Assist the Boone County School District with the implementation of the	10/2008	1/2009	None

	START	END	PREREQUISITES
system as requested.			
C. Construct an ArcGIS Server mapping service that will provide the public with information regarding school bus routes and bus stops.	1/2009	7/2009	None
D. Develop cost estimate and secure funding.			

34. Integrate the GIS with Systems Used by the Building Inspection Department (II, V, VII)	START	END	PREREQUISITES
A. Perform discovery involving the following aspects of the system: application architecture; basic use of the system (include training if possible); data storage format and location; data mining methods; and the possibility for real-time integration.	10/2010	1/2011	None
B. Outline and prioritize potential ways for the GIS to contribute to the efficiency and routine operations of the Building Inspection Department.	1/2011	7/2011	None
C. Develop an integration plan to be approved by the Building Inspection Department/Fiscal Court and presented to the Advisory Board.	7/2011	10/2011	None
D. Develop cost estimate and secure funding.			

35. Integrate the GIS with Systems Used by the Planning Commission (II, V, VII)	START	END	PREREQUISITES
A. Perform discovery involving the following aspects of the system: application architecture; basic use of the system (include training if possible); data storage format and location; data mining methods; and the possibility for real-time integration.	10/2011	1/2012	None
B. Outline and prioritize potential ways for the GIS to contribute to the efficiency and routine operations of the Planning Commission.	1/2012	7/2012	None
C. Develop an integration plan to be approved by the Building Inspection Department/Fiscal Court and presented to the Advisory Board.	7/2012	10/2012	None
D. Develop cost estimate and secure funding.			

36. Procure an AVL system for Use by Police, Fire and Emergency Management Personnel (II, V, VII)	START	END	PREREQUISITES
A. Assist the Sheriff's Office, Florence Police Department and the Fire Chief's Association with the creation of a Request For Proposal aimed at procuring an AVL system.	1/2012	5/2012	None

	START	END	PREREQUISITES
B. Participate with the vendor/system selection process, paying particular attention to the geospatial and GPS aspects of the proposals.	5/2012	7/2012	None
C. Outline long term resource costs associated with the selection of each system under consideration.	7/2012	7/2012	None
D. Assist the law enforcement agencies and fire departments with the implementation of the AVL system.	7/2012	Dictated by vendor	None

User Empowerment

37. Facilitate the Further Adoption of ArcGIS Desktop Within Member Agencies' Organization (I, II, V, VII)		START	END	PREREQUISITES
A. Identify agencies that possess the will and desire to take their GIS to the next level by purchasing ArcGIS Desktop and enabling (some of) their staff to become GIS experts for their particular agency.	A	7/2008	9/2008	None
B. Perform an in-depth discovery phase for each agency chosen in step A to identify use cases where GIS can provide benefits.	A	9/2008	12/2008	None
C. Create a GIS implementation plan to detail the benefits, costs (both immediate and ongoing), necessary training, and workflow adjustments that would result from the adoption of ArcGIS Desktop. Gain approval from Advisory Board.	A	12/2008	2/2008	None
D. Assist the chosen agencies with the integration of ArcGIS Desktop into their business operations.	A	2/2008	7/2008	None

38. Create a Formal User Engagement Program ()		START	END	PREREQUISITES
A. Develop new user orientation process.		9/2008	10/2008	None
B. Develop a GIS training curriculum and system to track user attendance.		9/2008	10/2008	None
C. Construct a user support system whereby issues and problems are tracked, monitored with their resolution noted for posterity.		9/2008	10/2008	None
D. Publish a newsletter for consortium members.	Q	Jul – Oct – Jan – Apr		Microsoft Publisher
E. Develop cost estimate and secure funding.	Q			

39. Restructure Annual User Group into Separate Committees Focused on Specific Aspects of the GIS ()	START	END	PREREQUISITES
A. Identify focus areas.	7/1/2010	9/1/2010	None

			START	END	PREREQUISITES
B. Choose agencies/staff to participate with committee.	X	8/1/2010	9/15/2010	None	
C. Establish/Review frequency, scope, and charges for each committee.	X	10/1/2010	12/1/2011	None	

Cartography

40. Establish Map Layout Templates for Each Agency (II, VII, X)		START	END	PREREQUISITES
A. Identify all potential agencies and/or departments that may potentially require their own map layout template.		7/1/2009	8/1/2009	None
B. Prioritize entities identified above.		8/1/2009	8/2010/2009	None
C. Set up meetings and complete the templates.		9/1/2009	1/1/2010	None
D. Incorporate new templates into each agency's MXD and PMF projects.		1/1/2010	2/1/2010	Map templates

41. Expand Thematic Map Library Offerings (VII, X)		START	END	PREREQUISITES
A. Build initial MXD projects containing thematic and background/support GIS datasets.		11/1/2009	7/1/2011	None
B. Edit basic MXDs to include pictures, text and other map elements that serve to create a distinctive look and feel the pertain to the theme being portrayed.		11/1/2009	7/1/2011	None
C. Publish all maps to PDF format and post on internet on the Map Gallery page.	A	11/1/2009	7/1/2011	None