



GIS Needs Assessment & Requirements Analysis

For
Maine County Government

Prepared For The
Maine Library of Geographic Information

June 2006



MAINE GEOLIBRARY

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Prepared by:



Richard Sutton | Applied Geographics, Inc.
Project Manager and Principal Author

Prepared for

The Maine Library of Geographic Information

Jim Page, Chair : GIS Vendors
Marilyn Lutz, Vice Chair : University of Maine
Dennis Boston : Utility Interests
Barbara Charry : Environmental Interests
William Hanson : Real Estate + Development Interests
Elizabeth Hertz : State GIS Activities
David Blocher : Office of Chief Information Officer - Designee
Paul Mateosian : Municipal Government
Judy Mathiau : Commissioner of Administrative + Financial Services
Will Mitchell : GIS Vendors
Kenneth Murchison : Statewide Association of Regional Councils
Sean Myers : Public Interests

Staff to the Board

Dan Walters : Maine Office of GIS
Larry Harwood : Maine Office of GIS

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Table of Contents

1	Introduction and Context	1
1.2	Study Objectives	1
1.3	Project Background.....	1
1.4	Process	2
2	Requirements and Needs	4
2.2	Overview of Forum Presentations	4
2.3	Forum Observations & Interview Findings	5
2.3.1	Political + Strategic.....	5
2.3.2	Technical, Education + Funding.....	6
2.3.3	Emergency Management Agencies.....	7
2.3.4	Deeds Registries.....	8
3	Functional Framework	10
3.2	Functional Framework	10
4	Implementation Strategies + Benefits	13
4.2	MeGIS County Liaison.....	14
4.3	Regional Service Centers.....	15
4.4	Benefits	18
5	Funding	20
	Appendix A: Forum Attendees + Interviewees	22
	Appendix B: Relevant Online Information Sources	24

1 Introduction and Context

1.2 Study Objectives

This study provides a requirements analysis and implementation framework for enhancing geospatial technology activities beneficial to Maine County government. Maine seeks to develop geographic information system (GIS) capabilities to promote current and future County administrative and planning initiatives and integrate these more effectively with the State's evolving geospatial services and data resources. In pursuit of these high level objectives, Maine hopes to:

- Increase County utilization of geospatial data and technical tools in areas where GIS provides benefits through increased efficiency, cost avoidance, or service enhancement
- Establish and strengthen regional service centers for providing geospatial technology access in such a way that County needs are addressed
- Identify and secure funding mechanisms that will provide baseline support for County geospatial needs in a recurring fashion

This study provides a strategy to address these objectives in order to move the counties, the state and other participating stakeholders toward more effective and integrated utilization of geospatial technology.

1.3 Project Background

Maine has a long history of active and effective delivery of GIS technology and services to all levels of government, educational institutions and the private sector. The Maine Office of Geographic Information Systems (MEGIS) within the state Office of Information Technology is the state agency responsible for coordination of these geospatial data delivery functions. MEGIS is overseen by the State GIS Executive Council as well as the Maine Library of Geographic Information (GeoLibrary).¹

In 2005 the Maine GeoLibrary and County Commissioners recognized that certain needs and unexploited opportunities exist at the County level for utilizing GIS more actively and productively. This study was commissioned to assess the current level of geospatial capability within County offices, to explore possible workflow changes by County officials and their constituents, and to evaluate possibilities for architecting collaboration among counties, municipalities, state government and others to cost-effectively deliver spatial services consistent with overall statewide GIS initiatives. This report builds on findings and developments resulting from the Legislative Resolve 23 Study² of 2002. Resolve 23 identified standards development, expanded data warehousing and access, new data capture, targeted application deployment and increased technical education as the primary pillars on which a coordinated statewide GIS

¹ Maine Office of GIS, Executive Council, GeoLibrary and associated information is available from:
<http://apollo.ogis.state.me.us/>

² Resolve 23 was a Maine Legislature-mandated, strategic GIS planning study aimed at providing a blueprint for ongoing, coordinated development of a strong statewide GIS. This study was delivered in 2002 and provided for creation of the GeoLibrary as well as well as ongoing geographic data and technology activities. The report is available online at:
<http://megis.maine.gov/sc/final/default.htm>

infrastructure must stand. On a more modest scale, these same pillars will be essential to successful construction of any county-specific system.

A number of proven, productive uses for GIS exist for County governments. Elsewhere in the United States, where County government plays a more expansive administrative role, this list is extensive and includes applications as diverse as property management and crime mapping. In Maine the core of identified stakeholders includes Emergency Management Agency officials, Sheriffs' Departments and Deeds Registries. Many additional constituencies were represented in forums and interviews over the duration of this project, but the vast majority of input and activity has centered on these three classes of participants.

Maine's County governments have typically lagged behind state agencies and even many of the larger municipalities in adopting and deploying spatial data technology. This need not be the case going forward. In fact, in GIS as with other technically intensive fields, significant benefits can accrue to late adopters. Because access to the technology is now less expensive than ever before, and experts are more available and accessible, possibilities presently exist at price points that would have been unthinkable even a few years ago.

Advancing County GIS infrastructure has the potential to not only provide administrative and managerial benefits at this level of government, but to flow outward to municipalities as well as integrate more fully upward with statewide efforts. This integrated continuum of data and applications may be exploited to provide a crucial keystone to bind local, regional and state efforts together into a smooth and consistent system.

1.4 Process

This study was undertaken in the following steps:

- 1. Requirements and Needs Findings:** Information characterizing current capabilities and future needs of Maine County government agencies and officers was gathered during forums and workshops held in multiple locations between June 2005 and February 2006. These forums were attended by a wide variety of County officials as well as participants from state government, regional planning agencies, municipalities and private companies. Forum attendees were introduced to or reacquainted with existing GIS technology available from government and private sources and encouraged to discuss and prioritize their unmet needs as well as existing technical and administrative abilities. Numerous individual interviews were also conducted by phone and email.
- 2. Functional Framework:** In conjunction with and following the requirements gathering effort, framework principles were identified, outlined and discussed extensively with project participants. These included best practices for building a long term geospatial system involving numerous stakeholders with varying needs and skills.
- 3. Implementation Strategy + Benefits Analysis:** Input from participants from forums and interviews was assimilated and distilled to produce feasible and practical conceptual design options for addressing as many County GIS needs as possible. Considerations in system design included potential service center locations and intra-government relationships, technical roles and responsibilities, and levels of effort required to attain implementation. Hypothetical design patterns for building County GIS for Maine were evaluated. Benefits of these possible systems were assessed for potential advantages they

might yield in advanced technology, improved data and process advantages they would generate for a County-oriented geospatial infrastructure.

- 4. Funding Options:** Following completion of strategic and tactical planning steps, potential funding mechanisms were explored that would permit development of County GIS capabilities in Maine.

2 Requirements and Needs

In the second half of 2005 and early 2006, four forums were held³ and numerous interviews conducted in order to identify Maine's needs and capabilities for county-level GIS. The forums consisted of educational presentations on the current status and content of Maine geospatial data infrastructure as well as comparative demonstrations of working GIS installations around the United States. The presentation portion of these workshops also included a basic technology primer to assist participants unfamiliar with the technology to think more constructively and creatively about its capabilities and applications.

The following sections provide brief summaries of some of the key discussion and findings that resulted from these events. Both forums and interviews produced considerable input relating to current functions that might be streamlined with easier access to GIS as well as improvements over current services that are not possible using current technology.

2.2 Overview of Forum Presentations

The project's forums and briefings were designed to introduce attendees to the scope and utility of existing geospatial technology and solicit specific information about their own capabilities and future needs and wishes. Brief summaries of the proceedings of these forums are covered below

- **June 2005, Gorham**

The first Counties GIS forum drew participants from the southern tier of Maine counties as well as a small number of municipal and state attendees. Counties represented at this workshop included **Androscoggin, Cumberland, Kennebec, Lincoln, Sagadahoc, Waldo** and **York**. Following overviews of MEGIS, County GIS in general and Maine efforts in specific, and a high level geospatial briefing, discussion ranged widely over county needs and capabilities. During the second half of the day the primary focus moved to the needs of law enforcement (County Sheriff Departments) and Emergency Management Agency requirements.

- **July 2005, Orono**

Attendees at this forum were drawn from the northern and eastern portions of the state. Counties represented included **Aroostook, Hancock, Kennebec, Knox, Penobscot, Piscataquis** and **Somerset**. Issues differed somewhat from the Gorham meeting, and included more discussion relating to applications and data necessary for support of planning and county administration. Technology and Maine geospatial infrastructure overviews were tailored to expose participants to existing web applications serving these sectors.

- **September 2005, Augusta**

The Augusta briefing was directed specifically toward county commissioners and included officials from throughout the state. In addition to providing the attendees with a review of the project's progress to date, potential benefits of county GIS were discussed

³ Materials relating to contents and proceedings of forums conducted as part of this project may be accessed from the site: <http://www.appgeo.com/clients/mecounties/>

and evaluated. Few commissioners participated in other forums so this provided a good opportunity to expose a large number of senior officials to both the technology and the process.

- **January 2006, Hallowell**

The final forum covered both presenting preliminary project findings as well as soliciting additional input in all of the major areas of investigation. This group spent considerable time discussing funding options and investigating cooperative strategies to provide technically competent staff to areas of government where it is most needed. Participants also spent time focusing on particular GIS data needs and possibilities for developing data standards for elements such as critical infrastructure.

2.3 Forum Observations & Interview Findings

The following presents a consolidated view of the major observations from county stakeholders that were captured as part of the data gathering process. Most of these were expressed in varying ways at different times and below they have been distilled to their essential sentiments and grouped thematically. They are organized by the following categories:

- Political + Strategic
- Technical
- Funding
- Emergency Management Agencies
- Deeds Registries
- Sheriff Departments

2.3.1 Political + Strategic

- **Regionalization is inevitable.** While municipal home rule is critical to the character of Maine, limited resources dictate that certain services will only be available if they are regionalized. Geospatial technology is one of these. In fact, GIS is an obvious asset in the ongoing evolution toward regionalization. There is no need to have hundreds of fractured information technology systems with associated costs of maintenance and optimization. For example, Lincoln County, with 19 towns and six school districts, could consolidate spatial data maintenance and analysis functions at the county seat, in Wiscasset.
- **Counties are caught in the middle, between the state and towns.** While county government should be a natural intermediary between towns and the state government, relations are frequently contentious and unproductive. Dedication to home rule makes towns leery of ‘outsourcing’ tasks to counties.
- **County GIS must serve both data consumers and producers.** While geospatial services delivery is generally understood to provide the means of distributing quality geospatial data, it is crucial to keep in mind the data *capture* value of a system integrating county officials. Whether it is E-911 road enhancements, crime or accident information from the sheriffs or critical infrastructure updates, the experts at the county level should be seen as *sources of data*, and any county-specific system should enable bi-directional data flow.

- **Counties can be agents of data standardization.** If properly designed and implemented, county GIS offices as regional service centers could act to standardize, maintain and distribute property data (parcels) for their member municipalities. Where MeGIS has implemented working standards (such as with parcels), counties could update and authenticate data prior to its delivery into the state repository. County GIS could provide an essential data validation function as content moves from hundreds of municipalities through sixteen individual checkpoints on its way into the Maine GeoLibrary.
- **Designing for cross border interoperability is important.** Given Maine's position at the extreme northeast of the US and its large common boundary with Canada, data should not stop at the border. It will be desirable to build systems that can look over Canada, New Hampshire and into the Atlantic in a seamless fashion to provide a common operating picture for all manner of place-based activities.
- **Non-government entities should be supportive of this initiative.** County-specific GIS should be implemented in a way that does not alienate or antagonize existing organizations. By example, counties should work with organizations such as the Maine Municipal Association to synchronize delivery of GIS services in a way that dovetails with that organization's existing management information system support work.
- **TTWWADI Inertia.** "That's the way we've always done it." This sentiment was invoked on numerous occasions in the forums, often specifically by name. The greatest impediment to initializing GIS activities at the county level is seen by many to be the reluctance to modify existing work patterns, even if there are significant advantages to be reaped.

2.3.2 Technical, Education + Funding

- **A county-level GIS technical support system must be developed.** Despite many generations of less costly machines and software, technical mastery of GIS remains challenging. Technical assistance for those with basic skills is also expensive and difficult to access. Cultivating a technical community of interest, both laterally among the 16 counties as well as vertically into the more general GIS user community⁴ is an essential for technology transfer and development of best practices.
- **Shared functions must be bundled.** It will always be more cost effective to have one qualified technician busily doing the work of many towns than employing many people in numerous locations without necessarily having sufficient work to fill their hours.
- **Staff resources are frequently inadequate and software is inaccessible.** Even at the county level in Maine, staff resources are insufficient to accommodate the addition of GIS personnel, and existing GIS technical experience is nearly non-existent. For example in Oxford County the EMA has only two staff; there is no possibility of either taking on GIS as an additional responsibility or hiring additional talent in. Throughout all offices of Maine County government, ESRI GIS software licenses have only been actively maintained for more than a year by EMA offices in York, Cumberland and Somerset Counties.

⁴ The Maine GIS User Group is the primary vehicle for such activity in Maine. Developing a Counties GIS focus within this organization would be valuable to this initiative. See <http://216.220.224.176/megug/home/index.html>

- **Counties should take advantage of more accessible hardware and software.** Machine and software capabilities are such that multiple towns' data can now be consolidated, managed and distributed using a single desktop computer or a small cluster. A basic setup to work with data and output high quality technical cartography that would have cost \$25,000 in the mid 1990s costs a tenth as much now. Without a legacy of sunk investment in expensive systems or obsolete technical expertise and infrastructure, counties have the advantage of starting fresh.
- **Networking and connectivity quality in many locations is exceedingly strong and more than adequate to support high bandwidth, distributed GIS.** Numerous counties have seen their networking bandwidth increase drastically over recent years. Aroostook and other counties sharing the international border with Canada have been upgraded with Federal Homeland Security grant money since 9/11.
- **Whenever possible, Counties should adopt existing standards for geospatial data development.** MEGIS currently enforces standards for digital property parcels automation through a grant program. Maine counties should monitor and adopt best of breed federal standards for layers such as critical infrastructure as these become available. For example, there is an emerging consensus on a set of homeland security map symbols that should be used both within on-line mapping systems and on hard copy maps; Maine should work to institute general use of these symbol sets.
- **Obtaining new funding for County GIS in the present economic climate is unlikely.** Maine is under significant budget pressure for existing programs. Unless a large and immediate return on investment can be identified as a consequence of County GIS spending, it shouldn't be pursued. That said, this study identifies several areas that should be pursued and that will generate tangible improvements in county GIS in Maine.

2.3.3 Emergency Management Agencies

- **County Emergency Management Agency GIS is functional in some places.** However, where this is true, it is largely achieved through individual dedication, resourcefulness and innovation and it is funded on a shoestring. By example, in Cumberland County one day per week of technical staff time is available for EMA mapping, but this is subsidized by volunteer input and lots of unpaid overtime. Hardware and software have been acquired through grant monies: a \$14,000 homeland security grant purchased computers and ArcView; a large format plotter was bought with flood hazard mitigation money. Slowly, an EMA GIS for the county is taking shape. But overall this remains discouraging as Cumberland County is the largest and most affluent county in the state, and still the GIS is built and supported with only scraps of non-operational funding. Another active EMA GIS county, Somerset, acquired ESRI software through a Mitigation Planning Grant to maintain the mapping of the Multi-jurisdictional All-Hazard Mitigation Plan and to assist with flood plain management for the Kennebec River Basin.
- **Emergency Management Agencies need consistent, dependable data.** Appropriate response to natural or manmade hazards requires a common operating picture among officials at multiple levels and locations. The ability to use and manipulate geospatial information in

such a way that the data passes smoothly from local to state to federal levels is essential to modern emergency response.

- **Emergency Management Agencies would benefit from a standardized program to capture critical infrastructure and sensitive population data.** Numerous data layers have been collected statewide pertaining to Emergency Management and First Response. However, no program exists to update and extend these data layers to consistently meet the needs of first responders. The data must be maintained at an appropriate level of accuracy and kept current for it to be useful for emergency response. In addition to critical infrastructure data sets, Maine EMA officials would like additional, standardized information on “sensitive populations” (e.g. day care centers, nursing homes, etc.) to assist with emergency response and planning. The flood event of May 2006 provides a potent example of the potential benefits of standardized, available data: candidates for evacuation as well as threatened routes should be readily at hand at the onset of such an event; in many cases they were not. Following the flooding, location-based lessons learned should be codified into GIS: specific flooded roadways, effective detours, evacuation routes and other valuable information should make it to the map to provide an increased level of preparation for the next event.
- **County geographic information systems should be functional in both a connected and non-connected environment.** Due to the fact that some types of emergencies – e.g. catastrophic explosion, hurricane – may bring down communication networks, certain of Maine’s County GIS applications (primarily those pertaining to Emergency Management) must be able to function without general telecommunications network and internet availability. While these applications should be designed to fully capitalize on the internet when it is available, the EMA GIS should have a full standalone capability, including local copies of all statewide repository data sets.

2.3.4 Deeds Registries

- **Deeds Registries are moving strongly to digital data, but are not GIS-enabled.** Many of Maine’s 16 Registries of Deeds have moved to, or are actively converting to digital data repositories. These are typically built around scanned (TIF) imagery of deeds with associated keywords for indexing and searching. These services are typically supplied through vendor services such as LanData and provide access to documents through a combination of subscription and per document pricing. Kennebec County has automated its repository in this fashion through 2004 and the system provides a fast, efficient way to locate and display documents. However, there is not a perceived need by most Registrars to spatially enable these data in order to make them “regionally intelligent,” or even an understanding of what this means.
- **Registries should integrate data management activities with constituent towns.** Maine land records maintenance is split between counties (deeds and surveys) and towns (parcels and tax assessment). This rift introduces significant difficulty to gathering information about individual parcels or clusters of properties. This friction is an artifact of colonial record keeping responsibilities and technically unnecessary in the age of digital information technology. If these data resources were synchronized or Registry-maintained it would add significant accuracy to the data and eliminate the lag between property transaction and data update (especially at the municipal parcel level).

- **Standardize capture protocols.** Simple enhancements, such as making municipal Map/Lot identifiers mandatory on all deeds, would move the process much closer to the goal of a smooth data continuum between municipalities and the state. Similarly, requiring digital submittal of surveys - and providing data validation to ensure these can be checked into a standardized repository – would add a dynamic and incremental update capability to the data stream that would yield enormous dividends into the future.
- **“Deeds Registries can not be everybody’s cash cow.”** County Registries of Deeds are frequently looked upon as a revenue source to fund new mandates. Transfer taxes do generate significant income, but the majority of this gets appropriated into the state’s coffers.
- **Registries are threatened by technology.** Digital data has potentially endangered the Registry role of data provider. Overseas companies have recently begun purchasing the entire data repositories of registries (Kennebec) to set themselves up as private vendors of this public data resource. While the Registries maintain “veto power” in their certification of deeds and registration of surveys, there is concern that in the near future many of the data query and display functions will be provided by independent (private) vendors. This is a natural trend in information delivery and since private firms will enjoy faster development cycles, slicker interfaces, more integrated data, and easier overall access, it is not improbable that registries may quickly lose a large share of their paying clientele.

3 Functional Framework

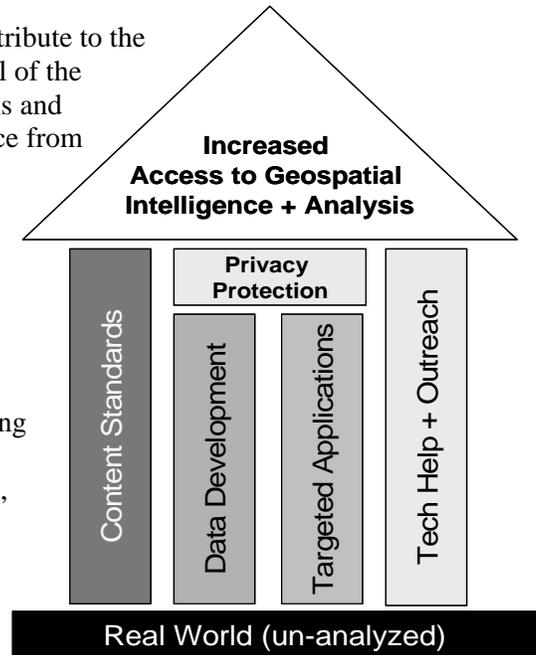
3.2 Functional Framework

All successful, large and ongoing geospatial implementations are built on a core set of fundamental principles and practices. These include: generally adopted and actively enforced standards, ongoing data improvement, targeted applications growing from a flexible development environment, and ample access to technical support with ongoing outreach.

The graphic at right illustrates how these fundamentals contribute to the construction of improved county-level GIS access. With all of the pieces in place - including systems, data access, applications and privacy protection - the barriers to accessing real intelligence from spatial data are lowered and benefits begin to accrue.

The architecture and functionality of a Maine Counties geospatial information system will need to be designed not only to serve counties but to support the broader implementation of GIS at all levels of government.

Standards. County GIS must participate in Maine’s ongoing efforts to develop and adopt GIS data standards including metadata standards, layer standards such as those for E-911, property parcels and others. For the counties this should involve making the most of modern technology and developing CAD submittal guidelines so that survey data submitted to the Deeds Registries can be provided in a standard, electronic format. Standards should also be applied to critical infrastructure data essential to the operations of EMA offices and Sheriff Departments.



GeoLibrary “Temple” modified from Resolve 23 Action Plan: Beginning from the Real World base and proceeding from black to white, key components of system development are applied to increase access to geospatial intelligence

Standards allow for an efficient, repeatable process of data roll-up from the capture points to the state GeoLibrary. Within project forums strong interest was expressed in having the State provide guidance for such standards. Having data that originates from multiple separate sources but uses the same data standards greatly assists in the process of combining these datasets into a seamless statewide GIS layers and dovetails in a vital way with web services, described below.

Data. Geospatial data is the most expensive component of a GIS. GIS requires comprehensive, current, and accurate data in order to bring the greatest value to an organization. Thus, once developed, data should be readily available to the widest possible array of users. The greater the user base accessing data and applications, the greater the return on investment. Similarly, the increased use will uncover more errors and as these errors are eradicated this will lead to overall improvements in the accuracy and reliability of the data sets. By increasing the ease with which

data can be shared the enterprise GIS infrastructure will deliver broad value to all state GIS users, as well as partners such as local cities and towns.

Major data capture efforts (such as expensive aerial orthophotography collection, or efforts involving tens of thousands of features) are outside the scope of county government. But counties could prove instrumental at organizing the acquisition of data from numerous municipal constituents and validating those data for consistency. Property parcels are the most oft-cited example here, but the same could hold true for zoning, school districts, or critical infrastructure features.

Active Application Development. Geospatial application development in 2006 means developing for the web. Web mapping opens up opportunities to quickly and easily access enormous digital repositories without the burden of maintaining large, complex data layers or expensive software on the desktop. Such services range from extremely general and lightweight consumer products such as those provided by Yahoo, Microsoft or MapQuest that serve millions of users daily, to very specific, highly tailored applications that municipalities use to manage and visualize local assets and that might only be queried a few times per week. Within this range the number and variety of new applications is growing very rapidly.

Capitalizing on web services is an important as part of the overall Maine GIS architecture. This architecture must support both the consumption of third-party web-services as well as the publishing of specialized web services, whether authored by the counties or elsewhere.

Web services deliver content and/or capability to an application rather than to an end-user. For example, Kennebec County might make all deed and survey information available through a web service. The web service would have a published application programming interface (API) that would describe how to access the service. As a web service the data content would be accessible to third-party applications that would communicate with the service via its API, and could thus bring the contents of that service (i.e. maps) into the application.

Such services, if successfully designed and implemented, could make it possible to build applications that integrate information from Kennebec County Deeds Registry as well as MeGIS and other sources. Transaction-based data request and delivery can be metered as well, thus potentially protecting revenue from independent vendors.

Web services can deliver both data (e.g., services for providing access to the state orthophotography) and functionality (e.g., a geocoding service that would return the latitude/longitude of a submitted address). Ultimately, using web services will both increase the efficiency of application development (multiple individual counties wouldn't need to redundantly build identical capabilities) and it works to reinforce the authority of a single service (ideally close to the native data source).

Privacy Protection and Access Control. Concerns about the protection of privacy can be addressed by limiting data access via the use of mechanisms such as password protection and the creation of classes of authorized users. In this manner, access can be controlled based on which data a user may have access to *see* (e.g. are property owner names available, or not?) and also based on what a user may be able to *do* with the data (e.g. can a user only view the data, or can they also edit it?). Ultimately, modern technology has rich capabilities for providing this type of differential data/system access and it is a matter of policy to decide what data are made broadly

and publicly available (e.g. property parcels) and which are available under restricted access (e.g. property owner names, or critical infrastructure locations).

Technical Assistance, Training and Outreach. Because Maine county-level GIS is currently underdeveloped and it is unlikely that there will be an aggressive effort to hire in outside talent, technical assistance will need to be generally accessible. The logical first place to look for such assistance is the Maine Office of GIS. County GIS users would benefit from participating in GIS user groups and structured training such as that offered through MeGIS should be explored to help build skills. Similarly, MeGIS should consider developing specific tools, courses and user groups aimed specifically at County users. The continued development of web services, data and metadata standards will help form the basis for the development of communities of use with other GIS experts throughout the state and region. An additional benefit of web services technology and data standards across the state is that system users versed in those standards can more readily move between organizations and be immediately productive with new systems.

4 Implementation Strategies + Benefits

If limited financial and technical resources were not an issue, the path to implementing County GIS in Maine would be clear and direct. Such a scenario, while presently unrealistic, is valuable as a point of reference and may be used as a type of a la carte menu of the universe of components contained within the most robust county GIS. Even the most demanding needs identified during this project could be addressed and alleviated with some combination of these components.

1. Counties would be provided with ample **technical infrastructure** to assure desktop and Web access to the full spectrum of existing and future geospatial data and services. Such infrastructure, would include:
 - Professional class computers with ample memory and high end graphics cards
 - Large and medium format plotting devices
 - Large, high resolution monitors and projectors for presentation purposes
 - Unrestricted access to GIS software licenses
 - High speed local networks and secure backup capacity
 - High bandwidth Internet access and high quality system administration support
2. **Standards** would be established and enforced. Specifically this would include:
 - Critical infrastructure and sensitive resources data and metadata standards, established by the Maine GeoLibrary in collaboration with the Maine Emergency Management Agency, county EMAs, local law enforcement departments and other concerned stakeholders.
 - Registries of Deeds protocols and standards would be established for adding key information to deeds records and municipal parcel features and tables to ensure seamless linking between them.
 - Uniform specifications for submittal of digital surveys would be established and enforced. These would be anchored to Maine's UTM 19 geospatial reference standard to allow them to technically integrate with all other layers in the GeoLibrary repository.
3. An active **data automation program** would be initiated to digitize County-centric data:
 - All land records and property parcels would be digitally automated to GeoLibrary standards.
 - Geospatial technical bureaus would be established at the county Registries of Deeds that would either perform ongoing updates to parcels as a formal step in the deeds registration process or validate this work to ensure that it is performed correctly by others (e.g. municipalities). This would result in the development of a perpetually maintained statewide parcel inventory, accurate to the most recent transactions.

- Towns with GIS capability would subscribe to this data source as a web service. Intermittent, selective extracts of these data sets could be provided to MeGIS to be incorporated into the Maine GeoLibrary providing access to state users for analytical purposes, and to create an archive.
4. **Applications** would be developed to meet specific county needs and to integrate counties into the general geospatial landscape. These would range from mundane data checking utilities to complex analytical tools. More specifically these might include:
- Services for web-based editing of parcels and critical infrastructure data
 - Browser-based, general-purpose geospatial data viewers aimed at county requirements. For example, a property/deed viewer, or a public safety common operating picture viewer.
 - Metadata checking and validation tools
 - Analysis applications (e.g. the creation of parcel abutter's lists)
 - Generic, configurable development tools for building customized applications utilizing GeoLibrary and allied data
5. **Technical assistance**, perhaps through MeGIS sponsored regional service centers, would be high quality and no cost, and structured training would be available at regular intervals. There would also be regularly convened groups of county GIS officials who meet at different locations around the state and compare evolving needs and problems.

Unfortunately, due to funding constraints, realizing all elements of this scenario is not likely any time soon. In the meantime, certain affordable steps may be taken that incrementally move Maine counties in the direction of this type of optimal implementation.

Maine's sixteen counties have widely varying needs and characteristics but they are in near perfect agreement in their lack of GIS capability. However, there is a widely held recognition that mutual value will accrue by fostering stronger relationships between MeGIS, the GeoLibrary and individual counties. Furthering these bonds is clearly the first step towards advancing county GIS in Maine.

4.2 MeGIS County Liaison

The first logical step, therefore, is to formalize this relationship between MeGIS and the county contacts in order to accelerate the process of further familiarizing key county stakeholders with the potential value that GIS provides. To that end, strengthening county access to geospatial services in Maine will likely involve some of the following steps:

- **Staff a full time position at MeGIS as a county liaison.** This need not be a highly technical individual. This county liaison will:
 - Work to identify and **build working relationships** with technical representatives in all of Maine's sixteen counties.
 - **Inform and instruct** county contacts about MeGIS data and services as well as services provided from independent sources.

- Collaborate with county contacts in **developing application specifications** for targeted tools to assist with specific tasks.
- Research grant opportunities pertinent to county **GIS funding efforts** and assist counties in applying for these grants.
- Work on **pilot projects** with counties to integrate and bundle geospatial initiatives of towns to exploit economies of scale and regionalization benefits. An example might be gathering all or a significant subset of municipalities in a county to apply for an upcoming round of municipal parcel grants.
- Monitor and **coordinate ongoing initiatives** in different counties to eliminate redundancies.
- **Report regularly back to the GeoLibrary** board on the state of the counties; report state of GeoLibrary activity back to the towns.
- The liaison would also work to institute appropriate data capture and **technical transfer relationships between counties and constituent towns**. These relationships may take a number of forms, based on the politics and level of technical advancement in various counties, and the ultimate outcome of if/how Regional Service Centers are developed (see below).

The County Liaison within MeGIS would need to understand the state's GIS landscape sufficiently to act as a type of geospatial services broker, receiving requests for assistance from counties, assessing these and properly directing them to where they can most efficiently and cost-effectively be responded to.

For instance, if an official from the Sagadahoc County EMA contacts the Liaison with a question regarding mapping of demographics or sensitive populations in the vicinity of hospitals, the Liaison should be able to determine whether the request may be satisfied with existing resources (MeGIS Hospitals layer accessed from the GeoLibrary as raw data or a web service) or whether the request will require a more elaborate response (e.g. the creation of a new data layer). The Liaison could potentially broker such requests to a state agency (MEMA) individual municipalities with working GIS services (Portland), to an RPA, or out to the private sector.

If multiple county officials are seeking to collaborate on development of land records enhancements or database integration and require additional funding to complete the task, the Liaison should be adequately versed in county-eligible grant-making sources and usher them into the applications process.

In cases where existing county data or services such as deeds and survey information might be valuable to initiatives being considered elsewhere in Maine government, the County Liaison should be a valuable resource for quickly accessing county content and making those data available to state personnel.

4.3 Regional Service Centers

As described above, and also envisioned as part of the original GeoLibrary Plan from 2002, part of the ultimate vision for fuller county GIS activity is the creation of Regional Service Centers

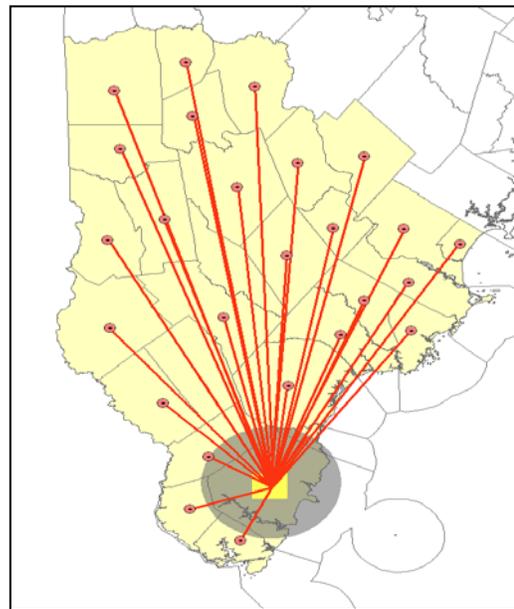
(RSC) that could provide direct support, and potentially GIS service to counties. Since the establishment of such RSCs would require new expenditures, it is assumed that they would be developed at a later point in time. In addition, there are many open questions about what the RSCs would look like, how many would be created and where they would be located. Ultimately, the initial experiences of the MeGIS County Liaison would help to form the most effective strategy for deploying RSCs.

The first goal of a county system is to provide county officials with tools that will help with more effective delivery of existing services. It is essential that any such system be integrated and coordinated with geospatial activities existing and planned at other levels of government in the state. But with nearly 500 municipalities and only 16 counties a key question is how many individual towns can an individual RSC comfortably accommodate? Again, the early experiences of the County Liaison would be instrumental in assessing the conditions in each of the counties and working with local personnel to identify the best, feasible support mechanism for each county/region.

This will not be an easy task, and this capability – providing regional support to municipalities - has not successfully grown in an organic fashion over the past 10 years of intensive GIS development by MeGIS and others such as Regional Planning Agencies (RPA). Regional Planning Agencies have been able to provide some local support, but even with solid levels of staffing their ability to fully engage their regions for GIS support has been limited.

There are several potential models for deploying regional service centers that could support either one, or several counties. These include, but are not limited to:

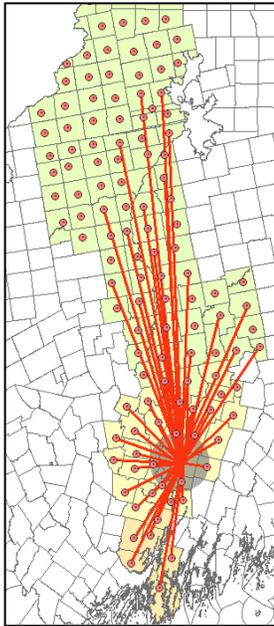
- Shiretown:** Under this model, the actual technical lead in the county is the most advanced geospatial member-town. An example of this might be York County where the Town of York has a significantly advanced program while most of the rest of the county lags. As depicted in the figure to the right, in a shiretown relationship, the front-running municipal site would act as the focal point for county GIS activity and would also potentially support the needs of other towns in the county. Data capture would be undertaken municipally but the lead GIS clearinghouse and data repository of record for the county would reside in the shiretown offices. The shiretown might also host browser-based viewing applications that could be distributed to county personnel as well as individual towns. Under this model, each county would have its own RSC and the shiretown would require specific resources to cover these additional responsibilities. These resources could be provided either by the state or by pooling contributions from



Schematic showing "shiretown" configuration: GIS needs of multiple towns served by county's strongest installation

member communities and the county. As appropriate, in some situations a single shiretown might be able to support multiple counties.

- Feature or theme-based collaborative:** In this case a number of towns might cluster together over their common interest in monitoring or managing a shared resource. The GIS would serve multiple functions but the primary binding theme might be the shared community of interest associated with a large environmental or jurisdictional feature. The image to the left shows a configuration where many towns receive GIS support services from a MeGIS sponsored Regional Service Center in Augusta based on their participation in three counties (Kennebec, Sagadahoc and Somerset) and adjacency to the Kennebec River.



- Traditional spatial distribution of regional support centers.** Under the is model, the state would determine the number of RSCs that could be created and supported and then would locate those facilities so that they are equally distributed on a geographic basis.

Once again, at present it is difficult to anticipate which model will be most effective, or even how many RSCs can be feasibly created and maintained. However, the proposed County Liaison will be in an excellent position to assess these factors. Thus, while providing county-based support the County Liaison will also take on the role of planning and budgeting for what expanded support might involve. In essence, the County Liaison provides a down payment on building the most effective RSC infrastructure.

4.4 Benefits

Depending upon level of commitment and of participation among stakeholders, there will be several tangible benefits to adding county participation into the coordinated Maine geospatial system. These benefits will accrue even if providing expanded county support is waded into slowly via a modest initiative.

It is important to understand that county officials and activities will by no means be the only beneficiaries of an effective County GIS mobilization. If properly orchestrated with local governments and integrated into Maine state-level government, county implementations may in fact be *more* beneficial to these stakeholders than to the counties themselves.

Benefits will comprise two major categories:

- **Economic benefits** such as efficiency increases, or friction reductions
- **Value added benefits** such as improvements or additions to current capabilities

Some of these potential efficiency increases and service improvements are described below:

- Regionalization of services is a strategy by which geographically or functionally allied entities join forces and pare out redundant capacity. Such activities can potentially enhance quality and professionalism of services through the efficiencies generated by eliminating redundant administrative resources. Spurred by Maine Development Foundation grants, numerous initiatives are being piloted and tested in the interest of regionalizing services. These include consolidating emergency communications services of multiple towns, centralizing municipal property assessing services to combine multiple towns, combining dispatching services of fire and police departments as well as dozens of others. GIS can offer significant value to many of these
- Coordination with state agencies will serve to improve county knowledge of the GIS resources available from the state thereby reducing potential redundancy. For example, during the initial county workshop in Gorham, county personnel expressed interest in seeing several data sets such as highway accident locations that are *already* available from MeGIS. The burden of data collection and maintenance is significant. It is essential that this not be compounded by duplicating work that has already been done elsewhere. An actively working County Liaison could largely eliminate this inefficiency.
- Establishing and adhering to standards and protocols for developing and maintaining geospatial data and coordinating the management of these data tables and layers will make data exchange between individuals *and applications* a reality. Data layers that are thematically affiliated are of little use if they are not technically consistent. As web services develop that are built to ingest data from multiple sources, data inconsistency is not an option. Parcel data from adjoining towns can be constructed such that they integrate seamlessly when delivered into such applications, but this will not happen without adherence to common standards. If they do not integrate they will be of no value anywhere but locally, defeating the core tenets of the technology and this initiative.

- Improving and synchronizing information delivery for access to all levels of government, different user groups and the public will make regulation and notification more streamlined. Having access to a consistent browser based tool will allow transmission of complicated relationships through simple and visual means.
- Data maintenance and quality will be improved by opening up existing data sources to an expanded user base: the more specifics of a data layer that are checked, the more quickly errors can be reported and evolution of the layer will occur. If a bi-directional data architecture is adhered to in development of county applications, where users are allowed to not only display and query information but also report errors or inconsistencies back to the validation sources, this evolution will become a reality. Data storage infrastructure and applications at MeGIS are currently well positioned to facilitate this. It should be emphasized for any county geospatial applications where local expertise in many locations (such as property data) is feeding regional or statewide system.
- Faster answers to questions with geospatial components: for example, an on-line property viewer application built with particular attention to county needs could be developed. This would provide access to comprehensive parcel data, could deliver information on property ownership and valuation information, as well as the environmental conditions of the parcel via a web-browser, all within a matter of seconds. Traditionally, uncovering this information would require physical visits to municipal facilities, deeds registries or both, as well as interaction with one or more state agencies to uncover the environmental information. Other examples might include deeds queries initiated by adjoining or nearby features or expedited visualization of historic crime or accident information by sheriff's offices.
- Improving existing county services and decision-making. GIS helps deliver the best and most current information while minimizing data gathering efforts. With more good information, more readily available to drive planning and decision-making processes, better plans and decisions should result.

5 Funding

Funding Maine County GIS will present significant challenges. While there is no immediately accessible revenue source available to meet the needs identified within this report, various opportunities have been identified that hold some promise.

Initial movement toward Maine County GIS will be modest, but hopefully initial investments will help secure future investments. The strongest recommendation from this report is to invest in a MeGIS County Liaison position that would collect information and develop more concrete requirements and constituency information from the counties. This person would also provide initial technical support to counties that are moving forward on their own. Because much of the physical and technical infrastructure needed by the Liaison exists presently at MeGIS, the anticipated funding burden necessary to support this capacity can be kept relatively low.

A number of alternatives have been considered to provide initial funding for this position. These include:

- **Seed money from county governments.** Small contributions (\$1000 - \$2500/year) from each county would provide much of the revenue necessary to fund the salary of this position. Numerous county officials and commissioners have expressed receptivity to such a strategy, though ability to contribute varies widely across the sixteen counties. Since the level of participation would also vary considerably (in a fashion that is difficult to predict initially) future contributions could be linked to level of use.
- **Grant money from USGS and other federal sources.** It may be possible to secure funding for another round of grant money to extend the information gathering phase of this process, providing revenue to augment a smaller pot of initial county seed money
- **Transfer Tax revenue.** Transfer tax revenue collected by county Registries of Deeds is a frequently coveted revenue source, and has been considered during the course of this project as well. Access to this revenue is complicated by the fact that county GIS will likely serve more masters than strict Deeds applications and there is understandable reluctance to fund unrelated mandates through Registry revenue streams.
- **Aroostook County Pilot using local resources.** Possibilities exist for individual pilot efforts undertaken independently by individual county governments. One of these involves Aroostook County's desire to test coordination between LURC and Maine Revenue Service data in developing parcels and deeds linkage work flow and technology. Available funding amounts for this initiative remain undetermined, but they would likely need to be augmented with revenue from other sources. In theory, the successes from early pilots of this nature would help document the benefits that would support the case for further funding.
- **GeoLibrary starter funds.** Small allocations from the GeoLibrary, either through parcels grants or other programs, to be used to accelerate promotion of GeoLibrary standards, especially in areas with little or no existing capabilities.

- **Regionalization funding.** Since 2005 grant money has been made available through the Maine Development Foundation for consolidating services across jurisdictions within shared local areas. GIS could easily be made a component of many of these. In many cases these initiatives would benefit by geospatial quantification and visualization of existing and potential future solutions. Coordinating regionalization activities inevitably introduces greater complexity into overall administration, and GIS can help to relieve this by making the full operational picture simple and accessible. GIS should be considered as a component of at least a subset of these initiatives if there are future grant rounds.

Appendix A: Forum Attendees + Interviewees

name	affiliation	role	phone	email contact
Fortier, Barbara	cog: AVCOG	Planner/GIS Coordinator	207-783-9186	
Murchison, Ken	cog: Northern ME Development Commission	GIS Specialist	207-498-8736	kmurchison@nmdc.org
Fournier, Patricia	county: Androscoggin	Clerk		patfacc@megalink.net
Potvin, Joanne	county: Androscoggin	EMA Director	207.784.0147	anem1@adelphia.net
Ouellette, Vern	county: Aroostook	EMA Director	207.493.4328	vern@aroostook.me.us
Sokolich, David	county: Aroostook	Public Works Director	207.493.3318	dave@aroostook.me.us
Crichton, Peter	county: Cumberland	Manager		Crichton@cumberlandcounty.org
Flaherty, George	county: Cumberland	EMA Director		flaherty@cumberlandcounty.org
Gilpatric, Aaron	county: Cumberland	Sheriff's Office	207.774.1444	gilpatric@cumberlandcounty.org
Joy, John	county: Cumberland	Sheriff	207.774.1444	joy@cumberlandcounty.org
	county: Franklin			
Dunno, Linda	county: Hancock			
Ott, Allan	county: Hancock	Register of Deeds		aott@co.hancock.me.us
Bustin-Hathaway, Beverly	county: Kennebec	Register of Deeds	207-622-0431	kcdeeds@kennebeco.com
Cerasuolo, Vincent	county: Kennebec	EMA Director	207.623.8407	kclepc@kennebecso.com
Devlin, Robert	county: Kennebec	Administrator	207.622.0971	bgdevlin@kennebecso.com
Birmingham, Sylvia	county: Knox	EMA Director	207.594.5155	sebema@knoxcounty.midcoast.com
Northgraves, Jeff	county: Knox	Manager, Knox Cnty Regional Airport	207.593.9323	jeffs@knoxcounty.midcoast.com
Green, Misty	county: Lincoln	EMA Director (acting)	207.882.75590	misty901@co.lincoln.me.us
Hovey, Ken	county: Lincoln	County Commissioner	207-882-6311	
Mason, Ken	county: Lincoln	Chief Deputy		kmason@co.lincoln.me.us
Silva, Marcia	county: Lincoln	Register of Deeds	207.882.7431	silva@co.lincoln.me.us
Tibbetts, Deborah	county: Lincoln	Administrative Assistant	207.882.6311	tibbetts@co.lincoln.me.us
Parker, Scott	county: Oxford	EMA Director		
Schorr, Dan	county: Oxford	EMA Director	207.743.6336	oxctyema@megalink.net
Briggs, Chip	county: Penobscot	Regional Communications Supervisor		
Collins, bill	county: Penobscot	Administrator		bcollins@midmaine.com
Hotaling, Keith (Lt)	county: Penobscot	Sheriff's Department		
Warren, Clifford	county: Penobscot	IT Director		
Bartley, Tony	county: Piscataquis	County Commissioner		tony-b@verizon.net
Henderson, Mike	county: Piscataquis		207.564.6500	
Moler, Daniel	county: Sagadahoc	Acting Clerk		depclerk@clinic.net
Morris, Rob	county: Sagadahoc	Coumunications Director	207.443.8201	rmorris@sagcommunications.com
Dunphy, Robert	county: Somerset	Commissioner, District 1	207.474.4515	rdunphy@tdstelme.net
Godin, Diane	county: Somerset	Register of Deeds	207-474-7401	regdeeds@mainster.net
Higgins, Bob	county: Somerset	EMA Director	207.474.6788	Robert.Higgins@SomersetCounty-ME.org
Spencer, David	county: Somerset	County E-911	207-474-6788	dave.spencer@somersetcounty-me.org
	county: Somerset	E911 Addressing Officer		
Arseneau, Barbara	county: Waldo	Clerk	207.338.3282	countyclerk@waldocountyme.gov
	county: Waldo	Commissioners		
	county: Washington			
Adjutant, David	county: York	Manager	207.324.1571 x2312	
Anderson, Debra	county: York	Register of Deeds	207.324.1576	
Bohlmann, Robert	county: York	EMA Director	207.324.1573	rbohlmann@co.york.me.us
Cote, Phil	county: York	Sheriff	207.324.1113	
Phillips, Mathew	county: York	Systems Technician	207.459.2322	mhphillips@co.york.me.us
Simonds, Sandra	county: York	Communications Manager	207.324.1046 x2320	slmurray@co.york.me.us
	county: York	Commissioners		
Hyde, Karla	edu: USM	GIS Lab Op Manager	207.780.5063	khyde@usm.maine.edu

Appendix A: Forum Attendees + Interviewees (con't)

name	affiliation	role	phone	email contact
Mosher, Rosemary	edu: USM			rmosher@usm.maine.edu
Parkin, Michael	Environmental Systems Research Institute	GIS Specialist		mparking@esri.com
Neimond, Kevin	National Association of Counties	Geospatial Specialist	202-942-4227	kneimond@naco.org
Stringfellow, Fred	National States Geographic Information Council	Association Manager	443-640-1075 x102	fred@ksgroup.org
Sutton, Rich	private: Applied Geographics	Consultant		rs@appgeo.com
Terner, Michael	private: Applied Geographics	Consultant		mgt@appgeo.com
Harmon, Steve	state: ME DEP	GIS Coordinator		harmon@midmaine.com
Faunce, Bob	state: ME GeoLibrary	County Rep to GeoLibrary		rfaunce@megalink.net
Walters, Dan	state: MeGIS	Director		dan.walters@state.me.us
Fine, Ron	town: Lincolnville	(Waldo County)		
Wood, Janna	town: Lincolnville	(Waldo County)		
Hayes, Joe	town: Stockton Springs			
Horr, Brett	town: York	GIS Manager		bhorr@yorkmaine.org
Grams, Scott	URISA	Education Manager		sgrams@urisa.org

Appendix B: Relevant Online Information Sources



Counties Study Forum Information Clearinghouse
<http://www.appgeo.com/clients/mecounties/>



Resolve 23 Study
http://megis.maine.gov/sc/final/Final_Report/default.htm



Maine GeoLibrary website
<http://www.maine.gov/geolib/index.htm>



Maine Office of GIS website
<http://apollo.ogis.state.me.us/>

