REPORT TO SHASTA COUNTY RTPA

SUBJECT		MEETING DATE	ITEM NUMBER
Shasta Regional GIS Platform Feasibility Study Final Report & Recommendations and Contract for Regional Parcel/Road Centerline GIS Data		10/26/10	6

RECOMMENDATION

It is recommended that the Board:

1. Receive a presentation on the Shasta Regional GIS Platform Feasibility Study and accept the Final Report & Recommendations; and
2. Authorize Executive Director to contract with ENPLAN (via state contract #3-10-70-1253C) to spatially correct and merge parcel and road centerline data layers within the south-central urban region (SCUR), not to exceed $131,000.

SUMMARY

The Shasta Regional GIS Feasibility Study Final Report & Recommendations and a prototype of the internet portal will be presented. Enhancements to regional geographic information systems (GIS) data are needed to proceed with the Agency's Sustainable Communities Strategy (SCS) planning approach. Grant funds have been awarded to the Agency for this purpose. Bids were received from two local firms qualified to provide GIS services. In both technical approach and cost, ENPLAN's bid was the highest ranked.

DISCUSSION

An SCS, as outlined by Senate Bill 375, must be developed and incorporated as a new element into the Agency's Regional Transportation Plan (RTP). The goal of the SCS is to reduce vehicle use through more transportation efficient land use patterns. In Shasta County, a 'beta' or trial version of the SCS is being developed in consultation with local agencies. It is estimated that the beta-SCS will be completed by early 2012. An official SCS will be prepared for local agency consideration prior to its inclusion in the 2015 RTP update.

The California Air Resources Board (CARB) has set a greenhouse gas emission reduction target for Shasta County at 0% per capita increase over the 2005 base year. The ability to defend against California Environmental Quality Act (CEQA) litigation and to attract grant funds may be affected by the region's capacity to meet this target.

Consistent with prior Board direction, the beta-SCS is currently under development. Current work tasks include the following:

Shasta Regional GIS Feasibility Study

VESTRA Resources will present the Shasta Regional GIS Platform Feasibility Study Final Report & Recommendations for Board consideration. Recommendations regarding technical specifications, protocols, and next steps are provided in the report for the initial setup of the platform. Key recommendations include the following:

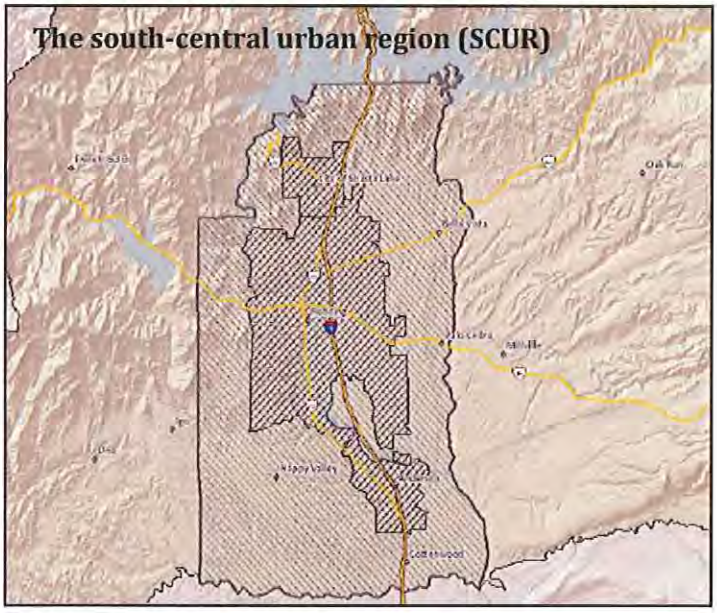
- Software – Esri's ArcGIS Server is recommended based on its 'out-of-the-box' ability to meet all near term and anticipated future applications of the platform.
- Hardware – Local hardware (versus remote server services known as 'cloud-computing') is recommended based on low annual costs for future maintenance and upkeep.
- Host site location – A partnership with Shasta College is recommended based on optimal physical facilities, organizational support, opportunities to leverage additional funding, and various co-benefits to the community.

Upon implementation, the platform will house all regionally merged GIS data, be utilized during development of the SCS, and help coordinate local agency SCS implementation efforts. The platform was also built to accommodate any local agency applications where spatial data is available, including the development of general plan housing elements, AB 32 related climate action plans, and environmental impact reports to name a few. It is anticipated that implementation of the platform will also lead to a variety of grant awards for the development of local and regional GIS data.

Development of Regionally Merged GIS Data

Development of an SCS will require enhancements to the region's GIS and modeling programs, beginning with spatially accurate (i.e. tied to actual survey locations) and regionally merged parcel and road centerline data. Land use, employment, and household data may then be assigned to each parcel.

Existing data in incorporated areas is largely accurate, while data in unincorporated areas outside of the SCUR is substantially out of alignment. These data, once corrected and merged, constitute the basic layers needed for enhanced travel demand modeling and SCS development.



Viewed in context of the SCS process, data in the SCUR is essential. Outside of the SCUR, where relatively little growth and development is occurring, even the very best data will not substantially impact travel demand and emissions modeling outputs.

For this reason, a request for bids was distributed to qualified local firms soliciting two bids: 1) a region wide effort and 2) a scaled-down 'budget' version based only on the SCUR. Two bids were received and evaluated by a technical panel based on the effectiveness of each firm's approach and cost.

	Technical Score	Bid (entire county)	Bid (SCUR only)
ENPLAN	39/50	$177,000	$131,000
VESTRA	37/50	$192,000	$133,000

ENPLAN's technical approach was ranked highest and also reflected the lowest total cost. ENPLAN is currently under contract with the state (contract #3-10-70-1253C) to provide GIS services. Firms on the state contract are determined to be technically proficient and have agreed to competitive pricing. Piggy-backing on the state contract will expedite the contracting process and result in a cost savings of roughly $12,000. It is anticipated that all tasks will be completed by September 2011.

The incremental cost associated with GIS data development outside of the SCUR represents nearly $50,000, or roughly one-third of the budget allocated for this project. While the value of such data to the SCS process may be limited, the county stands to benefit from such data enhancements. Data enhancements within this scope of work have long been planned by Shasta County Resource Management, but lack funding. An offer to partner with and share the cost of GIS data development outside of the SCUR was provided via letter to the Shasta County Information Technology (IT) Department (attached). The Agency is prepared to carry out both phases (i.e. the SCUR and unincorporated areas) concurrently if directed.

OTHER AGENCY INVOLVEMENT

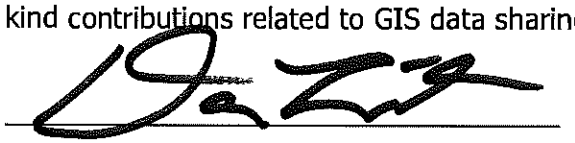
Local agencies participated in the generation of regional GIS data priorities and standards during development of the Shasta Regional GIS Feasibility Study. A commitment to provide ongoing technical advice and to contribute local data has been provided via letters of support from each agency. Local agency representatives assisted in the evaluation and ranking of consultant bids. The Technical Advisory Committee concurs with the staff recommendation.

ALTERNATIVES

The Board may choose to proceed with GIS data improvements across the entire region at once. Grant funding is available to do so, but this approach would ideally be completed in conjunction with the county. Areas outside of the SCUR could be added later should a more detailed analysis of unincorporated areas be required and/or if the county were to demonstrate an interest/need for such data in the form of cash contributions or participation in the SCS process.

FINANCING

The feasibility study is funded by a grant from the California Regional Blueprint Planning Program. Local match is provided via State Planning, Programming, and Monitoring (PPM) funds. Development of the core regional GIS data is fully funded by the Proposition 84 Modeling Enhancements program. Additional grant funds for implementation of the platform have been requested via the Proposition 84 Sustainable Communities Planning & Incentives Program. Local agencies have agreed to provide in-kind contributions related to GIS data sharing.



Daniel S. Little, AICP, Executive Director

DSL/DTW/jac

Attachments: Shasta Regional GIS Platform Feasibility Study Final Report & Recommendations
CMAS Purchase Orders (Full & Partial)
Letter to Shasta County IT Department

Shasta Regional GIS Data Platform Feasibility Study

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i. PRETEXT

Over the last year, the Shasta County Regional Transportation Agency (SCRTPA) carried out the Shasta Regional Geographic Information Systems (GIS) Platform Feasibility Study. This document is the culmination of that effort. Section ii, the executive summary, explains the feasibility study methods and recommendations for a regional GIS platform. The subsequent sections and appendices are technical in nature and therefore intended for a particular audience.

ii. EXECUTIVE SUMMARY

ii.i. FEASIBILITY STUDY BACKGROUND

The Shasta region presently has a decentralized network of geo-spatial data maintained by various public and private sector entities. The Shasta Regional GIS Feasibility Study is the region's first step toward the compilation, standardization, and merging of these many GIS data silos under one roof. The overarching goal of this effort is to minimize or eliminate the technological and informational barriers to coordinated regional planning. The scope of this study includes an exploration and evaluation of the following elements:

1. Data needs;
2. Data standards;
3. Software and technology options;
4. Hosting and hardware options; and
5. Implementation strategies.

The need for consolidated, standardized, and merged region wide GIS data and analysis capabilities is growing with the advent of regional blueprint planning, new planning requirements for metropolitan planning organization (MPO) regions per Senate Bill 375, and increased competition between regions for dwindling transportation infrastructure funding.

Whereas GIS data pieced together for the regional blueprint process was sufficient for conceptual, visioning purposes, more precise and detailed data will become indispensible when developing the region's Sustainable Communities Strategy (SCS), updating the Shasta Travel Demand Model, and lobbying the California Air Resources Board (CARB) for an achievable regional greenhouse gas (GHG) emission reduction target. California Environmental Quality Act (CEQA)-based litigation and Shasta County's competitive position for various state grants and discretionary spending are at stake.

Professionals from the region's well-respected GIS community participated during each phase of this study, acting on behalf of their respective agency/organization and the greater region by way of the Far North Regional GIS Council (FNRGC). The following local, regional, state, and federal agencies, academia, private industry, and professional organizations were represented:

- SCRTPA
- Shasta County
- Redding
- Anderson
- City of Shasta Lake
- Tehama County
- Shasta College
- VESTRA Resources Inc.
- ENPLAN
- CalFIRE
- Caltrans
- Department of Fish and Game
- Bureau of Land Management
- Far North Regional GIS Council
- Sacramento Area Council of Governments

Five technical workshops were held; each workshop focusing on a key work element of the project's scope of work. Small focus groups, individual interviews, and surveys explored each agency's potential benefit and contributions to the platform. Consensus was achieved at each stage of the process, including a recommended implementation strategy for the SCRTPA Board to consider. This report and its appendices document the technical approach, potential solutions, and ultimate findings of this study.

Upon implementation, the Shasta Regional GIS Platform will provide immediate value and benefit to the SCRTPA, including but not limited to the following:

- Reduced effort/cost required to obtain and aggregate data layers for various regional and multi-jurisdictional projects;
- Improved accuracy of regional data and analysis as a result of uniform regional data standards;
- Improved communication and planning between the SCRTPA and local, state, and federal agencies;
- Expanded funding opportunities for the SCRTPA's SCS planning effort/pass-through funding for local agency SCS implementation efforts ; and
- Enhanced accuracy of the inputs and assumptions needed for updates to the Shasta Travel Demand Model.

The general public and various community stakeholders – including Shasta College and region's geographic technology and service industry – would likewise benefit from the Shasta Regional GIS Platform over the long-term. Co-benefits include but are not limited to the following:

- Reduced burden on local agency staff and servers required for public distribution of maps and data;
- Improved public participation in critical planning and decision making processes; and
- Expansion of Shasta County's geographic technology industry through development of home-grown learning and career opportunities.

The Shasta Regional GIS Platform could serve a large variety of consumers (ranging from GIS professionals to the general public) and community issues (including public infrastructure and services; regional growth and development; emergency response

operations; environmental sustainability; and any other area of interest where spatial data is available).

Initially, the Shasta Regional GIS Platform will be utilized to encourage development of a regionally supported SCS plan and the implementation thereof. Data needs and web maps will first focus on the development of more transportation-efficient regional land use patterns, demonstrating greenhouse gas (GHG) emissions reduction capabilities, and eventual progress toward the region's GHG emissions reduction target.

It is anticipated that implementation of the Shasta Regional GIS Platform will be funded through grants. The SCRTPA has been awarded and applied for multiple funding possibilities to support implementation of the Shasta Regional GIS Platform and SCS development. Shasta College received a grant from the National Science Foundation to develop and administer a student intern program in support of these efforts.

Long-term maintenance and upkeep of the platform data, hardware, and software will require a stable funding source. Over the past couple of years, multiple bills have been proposed (SB 1445 and AB 153) to fund SCS mandated under SB 375. In these tough economic times, none have passed. It is anticipated that a consistent funding source will eventually be proposed and accepted.

ii.ii. DISCOVERIES

ii.ii.i. DATA REVIEW

DATA LAYERS

Data needs for a regional GIS platform were developed by reviewing similar efforts by other regional GIS cooperatives across the country, as well as core GIS data described by state and federal groups.

DATA STANDARDS AND PROTOCOLS

Regional data standards were developed to support data conversion between agencies, maintain a consistent data structure and evolve as a platform develops.

State, federal, other regional and industry standards were considered in development of regional data standardization guidelines.

DATA ACQUISITION

Data acquisition and conformity to regional standards can be automated using scripts and documented processes. By doing so, the data acquisition process would not be an onerous burden for local agency participation

ii.ii.ii. TECHNOLOGY REVIEW

Conceptually, a regional GIS platform could be developed to provide a range of different levels of functionality. Establishing a clear understanding of the requirements of the platform is fundamental to establishing a framework in which evaluations and recommendations can be made.

At a minimum level (Level 1) of functionality, a regional GIS platform could serve as a data warehouse, housing and making available:

- Source data from the different data providers,
- Regionally merged and generalized data, and
- Newly developed data needed for regional planning projects.

At the next level of functionality (Level 2), a user inter face is added to a GIS platform to allow for web-based viewing, basic query and analysis of the data.

At Level 3, web mapping applications are attractive, fast, and easy to use by their intended audience. At this level of functionality, map services play an important role. Technical users could use regionally merged and standardized datasets through two methods: by downloading the data to their local machine or by consuming map services authored by platform staff. Authored basemap services are high-performing and provide a common looking digital map of the region. The platform itself could consume map services authored by data providers whose data is static through modeling and analysis procedures. By using map services, the most recent and up to date data from authoritative sources is used, eliminating the need for storing data locally. In addition, this level could support mechanisms for user feedback or commenting. This feedback could provide the public with the opportunity to become participants in the planning process, giving input on the accuracy of datasets, identifying information gaps, and potentially providing a gateway for users to submit location-based comments or suggestions.

SOFTWARE CONSIDERATIONS

Many software applications are available for providing GIS information via the internet. Software considered during the feasibility study was evaluated based on the 'out-of-the-box' capabilities and the amount of effort required to deliver products that meets the initial needs of the SCRTPA. An ideal product would have minimal need for:

- Time-consuming programming or customization,
- Training to bring staff up-to-date on a new software configuration, or
- Multiple user-downloads or 'extensions'.

Also considered were:

- Compatibility with most common GIS data formats, and
- Conformity to state or local standards.

HARDWARE CONSIDERATIONS

Two hardware options were considered for a regional GIS platform: On-Site servers and Cloud Computing-based servers. They were reviewed based on expandability, manufacturer options, warranty, support and security.

HOSTING OPTIONS

An initial investigation of hosting locations was performed and a short-list of the most promising options was identified. These locations include the City of Redding, Shasta College, Shasta County (with the option of a joint hosting/management between Shasta County IT/GIS and SCRTPA), and VESTRA. A data host survey was administered to identify the willingness and capability of a prospective host to accommodate a regional GIS platform based on the recommended software and hardware.

ii.iii. RECOMMENDATIONS

ii.iii.i. DATA RECOMMENDATIONS

Following are recommendations for GIS and non-spatial data needs and plans for acquisition and management necessary to support the SCS planning and implementation processes.

DATA LAYERS

The following table outlines data layers that are essential to the SCRTPA's SCS plan and will require standardization and improvements before a region wide data merge is possible. It is recommended that this data be the initial focus for development and standardization for a regional GIS platform.

Existing Data Layers	street centerlines
	address points
	parcel data including ▪ current land use ▪ zoning and ▪ future land use
	generalized regional planned land use
Data Layer Gaps	bike routes ▪ existing ▪ planned
	sidewalks and crosswalks
	employment

DATA STANDARDS

It is recommended that regional data standardization guidelines evolve and be reviewed and revised as data, application functionality, and IT infrastructure develop for a regional GIS platform. Regional data schema guidelines described in Appendix C are intended to be used by technical staff that maintain a regional GIS platform and/or contribute data. For analysis purposes, it is recommended that data be stored in the California Teale Albers NAD83 spatial reference system.

DATA ACQUISITION

A recommended data acquisition plan was designed to facilitate the process when identifying input datasets, importing them into the platform, and maintaining these datasets over the long-term. Suggested data acquisition steps are to:

- Identify data providers and datasets,
- Establish a memorandum of understanding (MOU) and prepare for data sharing,
- Extract, transform and load data,
- Update and maintain data,
- Reviews suggested updates.

DATA MANAGEMENT

It is recommended that data management include the following aspects:

- Implement a set of QA/QC checks occurring in several places throughout the processing flow, and;
- Implement a data backup and recovery plan that ensures the regional GIS platform is protected from hardware and software failures

ii.iii.ii. TECHNOLOGY RECOMMENDATIONS

A variety of technological solutions were indentified and reviewed in light of a regional GIS platform, the SCRTPA's intended applications, and long-term flexibility. The following recommendations will ensure that technology is not the limiting factor moving forward.

SOFTWARE RECOMMENDATION

Based upon the short-term goal to use the platform to assist the SCRTPA in meeting SB 375 directives, it is anticipated that it will house and run the following GIS server-based applications:

Application	Requirements
DecisionTree	▪ MS Windows Server 2003 or later ▪ Esri ArcIMS or ArcGIS Server or another WMS-compliant mapping engine ▪ SQL Server relational database
Mobility Assessment Tool (currently under development)	▪ Esri ArcGIS Server, with Spatial and Network Extensions

Based upon these software requirements and the planned use of the GIS platform, Esri's ArcGIS Server is the recommended software product. This recommendation is reinforced by the following factors:

- Market share – Esri products currently have the majority of the GIS market.
- Product familiarity and expertise – Most GIS professionals have first-hand knowledge in the use of Esri software.
- Compatibility – ArcGIS Server can readily accommodate the differing data formats that exist between data providers.
- Out-of-the-box capabilities – ArcGIS Server comes with all of the essential utilities required by the platform, without requiring additional programming or customization.

Given this recommendation, options for hardware and hosting locations were evaluated based upon their ability to accommodate a platform running ArcGIS Server.

HARDWARE RECOMMENDATION

Although cloud-computing and local hardware options are fully capable of running a regional GIS platform, the ultimate recommendation is based on the availability of long-term funding. A one-time grant is the most likely funding source for the initial purchase and startup of the platform. It is unlikely to find a funding source that would be able to accommodate an annual, long-term budget for a Cloud-Computing based platform. For this reason, the On-Site Server option is the recommended solution.

HOSTING RECOMMENDATION

Shasta College is the recommended host location based on the following factors:

- Adequate facilities – Shasta County offers the optimal physical facilities for housing and protecting the platform's hardware. The data center facility also has a 1 gigabyte internet connection, the best available in all local hosts evaluated.
- Reduced software costs – ArcGIS Advanced Server typically costs $40,000 for initial purchase plus a $10,000 annual maintenance cost. By piggy-backing on college's educational license, this technology could be utilized at the cost of $2000 per year.
- Enhanced funding opportunities – As an educational facility, Shasta College will expand the number of potential grant funding sources. The College was awarded, for example, a National Science Foundation grant for a 'Geospatial Education Collaborative' to support GIS student involvement in community projects such as a GIS platform.
- Community benefit – By increasing the capabilities of the existing GIS program at Shasta College, there are numerous benefits to the local community:
    - Provides a resource for students and the community to obtain hands-on experience with cutting edge technology.
    - Functions as a neutral ground for multiple levels of government and private industry to share datasets, knowledge, and resources.
    - Provides home-grown job training/re-training in a growing industry.

ii.iv. IMPLEMENTATION

A data sharing MOU (Appendix A and D) should be signed for implementation of the Shasta Regional GIS Platform to be successful. The MOU should outline any limitations on usage of data.

Implementation of the Shasta Regional GIS Platform development should be phased as follows:

1) IT system setup - The recommendation for the Shasta Regional GIS Platform design is to implement ArcGIS Server (AGS) technology at Shasta College. It is further recommended that the initial implementation of a regional GIS platform be built on a virtual server at the college. In a virtual environment the early implementation of a regional GIS platform will conserve IT resources until such time that servers are purchased and resource allocation has been determined by the college.

2) Data acquisition - The recommendation for regional GIS data acquisition and management is to use basic GIS skills to acquire and update the data. Utilizing basic skills, as opposed to automated processes, encourages student involvement in the process and eliminates the need for a GIS programmer in the acquisition process.

3) Integrate map services and web viewer - While a regional GIS platform can serve a large variety of the community issues, the recommendation is for the initial map services to address immediate needs of the SCRTPA in dealing with the development of a Sustainable Communities Strategy. Tasks outlined in the Sustainable Communities Planning Grant Application submitted by the SCRTPA can serve as a starting point for defining map services and web mapping applications.

4) Establish platform maintenance program - The Shasta Regional GIS Platform Subcommittee's knowledge, input and support are invaluable in implementing the platform. It is recommended that quarterly meetings be scheduled to give updates and seek input on major decisions from the subcommittee.

PROJECT AND TECHNICAL DOCUMENTATION

1. CONTEXT OF THE BROADER GOAL

The SCRTPA is an island, one-county metropolitan planning organization (MPO) bordered on all sides by rural counties. The south-central urban core of Shasta County designates the SCRTPA as an MPO. The agency is in a unique position to provide a template for developing sustainability plans in small and medium sized metropolitan regions, as well as for partner agencies in the North State Super Region (NSSR).

As an MPO, the SCRTPA is the transportation policy-making organization for the Shasta County region and is the potential grant recipient for the following funding opportunities.

- California Regional Blueprint Planning Projects (Blueprint)
- Proposition 84 Model Improvement Plans
- Proposition 84 Sustainable Communities Strategies

Each of the above funding opportunities is related to California Assembly Bill 32 - Global Warming Solutions Act (http://www.arb.ca.gov/cc/factsheets/ab32factsheet.pdf) and the subsequent California Senate Bill 375 - Redesigning Communities to Reduce Greenhouse Gases (http://gov.ca.gov/fact-sheet/10707/). Under SB 375, the SCRTPA must include a SCS in the 2014 scheduled update of its regional transportation plan. This strategy must demonstrate how the region will meet its GHG reduction targets through more transportation-efficient land use patterns and characteristics.

Shasta*FORWARD*>> was the SCRTPA's Blueprint project. It was successfully completed in 2009. Several of the surrounding rural counties' transportation commissions, listed below, have been granted Blueprint funding to proceed with regional planning efforts similar to Shasta*FORWARD*>>.

- Tehama County Transportation Commission
- Modoc County Transportation Commission
- Lassen County Transportation Commission
- Humboldt County Association of Governments
- Mendocino Council of Governments
- Lake County/City Area Planning Council
- Glenn County Transportation Commission
- Trinity County Transportation Commission.

A significant portion of the Shasta*FORWARD*>> process dealt with GIS. Blueprint specific regional GIS data was developed to piece together county and city general plans for conceptual/visioning purposes. Also, regional attractors, discouragers, and exclusion layers were developed, based upon various elements that affect land use allocation. These layers included circulation elements, existing urban areas, growth regions, water and sewer service districts, hydrology and environmentally protected and sensitive lands.

The growth scenario modeling portion of Shasta*FORWARD*>> used UPlan, a GIS raster modeling software program developed by University of California Davis. In this capacity, the project consisted of

- Alternative land use scenario modeling;
- Performance measures calculated related to land use allocation and transportation; and
- Cartographic results showing projected development, extruded grids showing development intensity and animations.

Now in the implementation phase, the SCRTPA has been working on a number of technical GIS projects that will employ the platform to develop and carry out the SCS. Presented here, the feasibility study is an analysis into the possibility of a regional GIS data platform where regional data, spatial analysis, decision-making support, and a framework to develop custom tools and applications are made available.

1.1. REGIONAL GEOGRAPHIC INFORMATION SYSTEMS

There has been a local desire to create a regional GIS platform in the North State for many years. The need, motivation, and available resources have increased with projects like Shasta*FORWARD*>> and state-wide initiatives like SB375. The intent of a regional platform is multi-faceted.

- The public, local, state, and federal governments benefit from being able to access regional datasets easily for various purposes.
- The need and cost of maintaining individual jurisdiction, agency or other entity spatial data warehouses within the region are greatly reduced or eliminated.
- Decisions made at local, state and possibly Federal levels will be based on data that has credibility with the local government.

Impediments addressed in the feasibility study include:

- Lack of a legal framework, memorandum of understanding (MOU), or other document that would allow various participating agencies to apply resources to the collective mission.
    - Shasta County and the City of Redding signed a MOU in February and March of 2010 (Appendix A).
    - Agency staff from all jurisdictions attended workshops and provided technical advice in the development of the feasibility study.
- Funding to build and maintain a regional GIS platform.
    - Public, academic and private partnerships have developed.
    - State funding initiatives are being proposed.

1.2. FEASIBILITY STUDY METHOD

The feasibility study conducted in-depth research of similar efforts, standards, current technology, and trends. Towards the ultimate objective of a regionally supported and regionally used outcome, the feasibility study sought out and gathered input from the Regional GIS Platform Subcommittee (subcommittee).

Workshop techniques included informative presentations, facilitated open discussions, review of documents and project task prioritization. The objective of the workshops was to provide an informal, yet effective venue for subcommittee input and interaction. The workshops enabled regional collaboration through web-casting, reaching a wider audience of GIS professionals and interested parties. Presentations updated workshop participants about project developments and encouraged input regarding future tasks. Documents and presentations from the workshops and related to the feasibility study are available through the SCRTPA's website:

http://www.snowcrest.net/shasroad/RTlocalplanning.html

Workshops were supplanted by focus groups, one on one interviews, on-site visits and surveys.

2. PHASE 1 - GIS DATA ACQUISITION AND MANAGEMENT

The objective of Phase 1 was to assess data needs and develop plans for acquisition and management of the data.

2.1. DATA LAYERS

The objective of this activity was to assess GIS and non-spatial data needs for a regional GIS platform necessary to support the SCS planning and implementation process.

Multiple sources were reviewed to create a data layer matrix (see next page). Data considered to be the most critical GIS datasets defined by the California Geographic Information Association (CGIA, http://www.cgia.org/geospatial-draftplan.htm) were included. Data compiled in similar regional GIS efforts across the country were reviewed, along with previous projects such as Shasta*FORWARD*>> and SACOG's Blueprint. The matrix identifies the agency(s) responsible for the data layer creation, availability, and status and update frequency. These factors were addressed through informal GIS data surveys and review of the data layer matrix by subcommittee members.

The data layer matrix prioritizes core and secondary datasets. Core datasets were determined to be data essential to the SCRTPA's SCS plan. Other factors that went into the prioritization of the data layers were the possibility for immediate utility and benefit and data related to future funding opportunities. As the initial use of the platform will be to support the SCRTPA's SCS plan, layers related to transportation and land use were considered the highest priority. The following table summarizes these layers.

Core/Project Essential Data Layers for SCS

Existing Data Layers	street centerlines
	address points
	parcel data including ▪ current land use ▪ zoning and ▪ future land use
	generalized regional planned land use
Data Layer Gaps	bike routes ▪ existing ▪ planned
	sidewalks and crosswalks
	employment

GIS PLATFORM COMPONENTS	GIS DATA PROVIDERS																														
	CITY			COUNTY					REGIONAL			STATE						FEDERAL				OTHER									
	ENPLAN																														
AUTHORITATIVE SOURCE	REDDING	ANDERSON	SHASTA LAKE	ASSESSOR / CLERK	RESOURCE MANAGEMENT	PUBLIC HEALTH	IT	Public Works	SCRTPA	LAFCO	REDDING AREA BUS AUTHORITY	CalAtlas	CalTrans	ARB (Air Resources Board)	DFG (DEPT. FISH AND GAME)	DSHPD	HMMP (DEPT. OF CONSERVATION)	CALFIRE	DOI (USGS, BLM, USFWS, NPS)	USDA (USFS, NRCS, FSA, NAIP)	DHS (FEMA)	DOT (FHWA)	DOC (US CENSUS, NOAA)	MCCONNELL FOUNDATION	SHASTA LAND TRUST	INFO USA	AMTRAK	GREYHOUND
CORE REGIONAL DATA SETS																															
ESSENTIAL TO IMPLEMENTATION OF SB375 (reduction of GHG due to cars and light trucks)																															
Transportation																															
Regional Street Centerlines	☑	☑	☑		☑														☑	☑											
FAF2																						☑									
Railroad													☑															☑			
Limited Access Points (Ramps)									☑				☑																		
Regional Road Network									☑																						
Existing Bike Routes	☑	☑	☑			☑																									
Walking Routes / Sidewalks	☑	☑	☑			☑																									
Traffic Analysis Zones (TAZs)									☑																						
Bus Stops											☑																				☑
Bus Routes											☑																				☑
Park and Ride									☑																						
Survey Controls									☑																						
Land Use																															
Parcel	☑	☑	☑	☑																											
Survey Controls					☑																										
Public Land Survey System																			☑												
Williamson Act - Parcel				☑																											
Timber Production Zone - Parcel				☑														☑													
Developed Land									☑																						
Undeveloped Land					☑																										
Regional General Plan Land Use	☑	☑	☑		☑				☑																						
Building Permits	☑	☑	☑		☑																										
Zoning	☑	☑	☑		☑																										
Trip Generators																															
Parks and Recreation Sites	☑	☑	☑		☑				☑										☑												
Colleges																			☑												
Schools									☑																						
Employment Centers																												☑		☑	
Libraries																			☑												
Airports																			☑									☑		☑	
Hospitals *(Health Care Facilities)*																☑			☑									☑		☑	
Environmental																															
Hydrography	☑	☑	☑																☑												
Precipitation												☑											☑								
Elevation Model	☑	☑	☑																☑												
Open Space	☑	☑	☑		☑										☑				☑	☑				☑							
Open Space Acquisition																			☑												
Land Cover			☑															☑		☑											
Flood Zones	☑				☑																☑										
Prime Agricultural Lands																															
Soils																				☑											
Critical Mineral Resources	☑				☑																										
Vernal Pools															☑																
Sensitive Species															☑																
Deer Range															☑																
California Air Basins														☑																	
Wetlands																			☑												
California Protected Areas Database 1.4													☑																		
Imagery																															
Ortho Imagery	☑	☑	☑						☑				☑						☑	☑											
Geodetic Controls													☑										☑								
Infrastructure																															
Sewer		☑	☑																												
Water		☑	☑																												
Electric			☑																												
Drainage		☑	☑																												
Irrigation canals																															
Street Lights																															
ADDITIONAL CORE DATA SETS																															
Boundary																															
City Limits	☑	☑	☑																												
County Limits					☑				☑																						
Community Boundaries					☑				☑																						
Spheres of Influence	☑	☑	☑		☑																										
Fire Districts		☑	☑							☑								☑												
School Districts					☑																										
Water Districts					☑				☑																						
Sewer Districts					☑				☑																						
Broadband Service								☑																							
City Council Districts																															
Board of Supervisor Districts								☑																							
Voter Precincts								☑																							
ZIP Codes (ZCTA)																							☑								
Census Tracts																							☑								
Census Blocks																							☑								
Census Block Groups																							☑								
Redevelopment Zones	☑	☑	☑		☑																										
Enterprise Zones	☑	☑	☑		☑																										
Places (Buildings and Facilities)																															
City Halls	☑	☑	☑																☑									☑		☑	
Fire Stations																		☑	☑	☑								☑		☑	
SECONDARY DATA SETS																															
Annotation																															
Major Arterials																															
Arterial Streets																															
Freeways																															
Streets																															
County Names																															
City Names																															
Community Names																															
Rivers																															
Streams																															
Additional layers related to tourism																															
Trails		☑	☑																☑	☑				☑	☑						
Trailheads		☑	☑																☑	☑				☑	☑						
Topograpic Maps																			☑												
Golf Courses																															
Additional layers related to Computer Aided Dispatch (Emergency Response)																															
Map Book (Road Atlas)																															
Response Areas																															
Local, State, Federal	☑	☑	☑		☑															☑											
Ambulance, Fire, Police																															
Address Points		☑	☑		☑																										
Additional layers related to public works																															
Snow Load / Pack					☑																										
Crosswalks																															
High Hazard Risk Areas									☑																						
Additional layers related to loss of revenue																															
Additional layers related to business community																															
Shovel ready									☑																						
Restaurants (w/ grease traps)	☑																														

2.2. DATA STANDARDIZATION GUIDELINES

The development of regional standardization guidelines (language defined in Appendix B) has three primary objectives:

- Provide a clearly defined foundation upon which to support the conversion of city, county, and other locally maintained core data sets to a regional format.
- Provide a data structure upon which to design and build a regional GIS platform.
- Provide a well-documented baseline upon which to guide regional data model development to ensure compatibility and to provide the ability to share data.

State, federal, and industry standards were considered in development of regional data standardization guidelines. SACOG -a region that consists of six counties, including twenty-two cities- has been through a similar process of developing data standards. Their data standards were reviewed and held in high regard in the development of regional GIS platform guidelines.

Esri's data model for local data needs and specifications is called "GIS for the Nation". It offers a sample geodatabase and was likewise used when developing regional data standardization guidelines. It is recommended that "GIS for the Nation" be used as the default standard to follow when a specific list of data attributes has not been defined.

The intended geographic scope of the guidelines is Shasta County. It is anticipated that guidelines and a regional GIS platform will eventually be adopted by neighboring counties, Sacramento Valley regions, and the NSSR.

Regional data standardization guidelines evolve and continually should be reviewed and revised as data, application functionality, and IT infrastructure develop for a regional GIS platform. The guidelines therefore should be maintained cooperatively by program staff that maintain a regional GIS platform and/or contribute data.

2.2.1. SCHEMA GUIDELINES

Regional data schema guidelines (Appendix C) are intended to be used by technical staff that maintain a regional GIS platform and/or contribute data. The guidelines contain the recommended standardization of the highest priority core regional data sets.

Care was taken to develop guidelines that are:

- Simple, easy to understand, and as logical as possible,
- Uniformly applicable, whenever and wherever possible,
- Flexible and able to accommodate future expansions, and
- Dynamic in terms of continuous review.

2.2.2. SPATIAL REFERENCE SYSTEM GUIDELINES

For analysis purposes, data should be stored in the California Teale Albers NAD83 spatial reference system. California Teale Albers NAD83 is optimized for area calculations and has widespread use by other organizations. The following is an excerpt describes the projection and datum combination:

California Teale Albers is an adaptation of the Albers Conical Equal Area projection as defined by the former State of California Teale Data Center GIS Solutions Group. It is a statewide projection, making it popular for organizations that map statewide resources. You may hear this projection referred to as "Teale Albers", "California Albers", or just "Albers" (be aware, however, that adaptations of the Albers projection exist for other areas).

For web-mapping purposes, the WGS 84 Mercator projection should be considered if space is available to store the data in two different projects. Google Maps, Bing Maps and Esri's arcgis.com use a similar project.

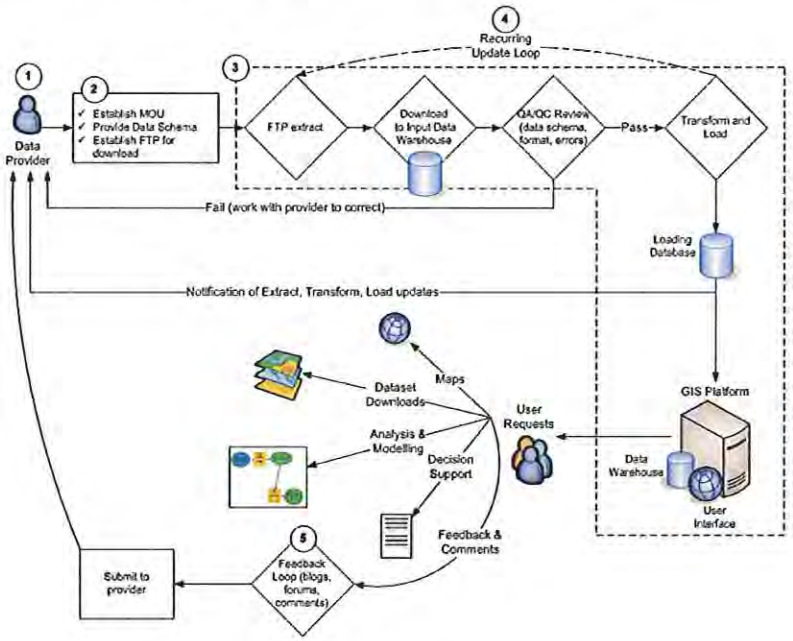
2.3. DATA ACQUISITION PLAN

The objective of this activity was to develop guidelines for participating agencies and platform staff to obtain and incorporate datasets into a regional GIS platform.

The data acquisition plan, described below, was designed to facilitate the processes involved when identifying input datasets, importing them into the platform, and maintaining these datasets over the long-term. It is critical to the successful development and maintenance of a regional GIS platform that beneficial relationships be developed between the project and its data providers. Key goals of the platform are to create agreements and processes which will:

- Lead to the long-term improvement of regional spatial datasets for all participants and
- Minimize or eliminate any undue burdens on local agencies required for participation.

Data acquisition involves a multi-stepped process. Flexibility, recurrence, and data quality are important considerations. The following diagram illustrates the general flow of acquisition, followed by a more detailed description. This process is meant for general reference; actual process may require additional or revised steps.



2.3.1. STEP 1 - IDENTIFY DATA PROVIDER AND DATASET

The first step in the acquisition process is to identify who the data providers are and who is responsible for data management within each organization. GIS platform staff initiates contact with data providers to begin the data acquisition process. The provider communicates with the GIS platform staff to identify datasets for incorporation into the platform. Core regional datasets and the respective data providers are identified in the data layer matrix described earlier.

2.3.2. STEP 2 - ESTABLISH MOU AND PREPARE FOR DATA SHARING

Using the identified core regional dataset, GIS platform staff initiates contact with the data providers. The steps involved in this process include:

- Establishing a Memorandum of Understanding (Appendix A and D) for sharing the dataset(s). At this point, any limitations on usage are documented within the MOU.
- Data providers supply the current data schema, metadata, and any other associated information to platform staff.
- Data provider and platform staff work together to establish a FTP site for data transfer activities. Ideally, this would utilize an existing FTP site managed by the data provider. If no site exists, platform staff would assist the data provider to locate the best solution for data transfer.

2.3.3. STEP 3 - FTP EXTRACT, TRANSFORM, AND LOAD PROCEDURES

The majority of work involved in data acquisition occurs during the dataset extraction, transformation, and loading procedures. The overall approach for data acquisition and incorporation into the platform is to establish mechanisms for the ongoing retrieval, hosting, and maintenance of input datasets that does not burden local agencies. The initial step involves establishing an automated FTP extract service. This service could be created using automated scripts (e.g. Python script) to download and extract datasets from their source FTP sites to the GIS platform's input data warehouse.

With the dataset on-hand, the QA/QC review would be conducted. Using the data schema and metadata, platform staff conducts an initial QA/QC review of the dataset. The main intent of this review is to ensure that essential fields are present to be used in the transformation and incorporation process. If issues arise that impede the procedures for incorporation into the platform, the data provider should be notified and platform staff should work with the data provider to find a viable solution. Once a recurring update loop is in-place for a dataset, any changes to the data providers' schema, format and other items which impede incorporation would be identified in the QA/QC process.

Following a successful QA/QC review, platform staff develops any transformation services necessary to incorporate the dataset. The transformation process includes, but is not limited to, the following steps:

- Translation of geometry and attributes into the platform data guidelines.

- Potential change in coordinate system and projection
- Potential change in data format (i.e. into a SQL database with some data going into tables registered with ArcSDE).
- Addition of specific attribution (perpetual unique identifiers, dates and other items).
- Creation and/or modification of city codes, county codes and other standardized naming domains.
- Incorporation and updating metadata to reflect any transformations.

Depending upon the format of input datasets, this could be accomplished using field mapping procedures, SDE views, or other automated means for transformation. Once the transformation is complete, the data provider would be asked to review the results of that transformation in the loading database to make sure the core "meaning" of the data has been preserved and that it still functions as designed. The transformation routine would be reusable and would be used during maintenance for the data provider for which it is developed.

Following a successful transformation, the dataset is placed on the GIS platform. An automated notification (e.g. email message) of this transaction could be generated and sent to the data provider and platform staff.

2.3.4. STEP 4 - RECURRING UPDATES AND MAINTENANCE

Once the dataset is incorporated into the GIS platform, a maintenance and update plan is established. Automated processes would be put into place for each dataset that undergoes a regular-interval update by the data provider. On an established interval (e.g. quarterly), the extract, QA/QC review transform and load processes would be run. If appropriate for the dataset, change detection and change management software could be used for updates. The goals of these processes are to detect changes in a dataset since the last time a provider submitted data. Only detected changes are introduced to the database for data preparation. This greatly reduces the maintenance processing required. Change detection works very accurately when a provider maintains a perpetual unique identifier for each feature. If there is no perpetual unique identifier then the change detection process uses geometry comparison to detect changes. Geometry comparison is not nearly as effective as comparing perpetual unique identifiers, but would suffice. The change detection process produces a report that is returned to data providers. It includes a summary of changed features and/or attributions.

2.3.5. STEP 5 - REVIEWS AND USER-SUGGESTED UPDATES

In some instances, a regional GIS platform could serve as a gateway for providing input on data creation, suggested edits or corrections. An important component of this is an established feedback loop process to provide updates back to the original data provider. Multiple levels of feedback can be developed depending upon the needs identified by GIS Platform staff and data providers. This could include items such as:

- Allowing users to submit comments identifying potential errors in the datasets;
- Facilitating the collection of new datasets and redlining procedures; and
- "Crowd sourcing" – collecting voluntary information from users (e.g. identifying the locations of potholes by the general public using an online spatial mapping application and data submission form).

These feedback mechanisms could be submitted to the responsible data provider for review and incorporation into their master datasets as appropriate.

2.4. QA/QC STANDARDS

A data acquisition plan for a GIS platform is designed to minimize the possibility of errors when importing datasets into the platform. An important component of this process is a set of QA/QC checks occurring in several places throughout the processing flow. Results are time and money saved by both the data providers and regional platform staff, and ultimately result in a finer product. The QA/QC checks may vary throughout the process but the purpose is universally the same, to determine if the data meets the standards of the regional GIS platform and to provide the necessary support to the data provider for implementing the necessary changes. The checks are often beneficial to the data provider as well by indentifying missing data, anomalies or errors, and also provide the framework for providers to use regional platform data down the line.

The acquisition procedure for data submitted by providers must be connected, continuous and consistent, and the earlier in the process errors can be indentified the more smooth the acquisition will be. A regional GIS platform could house a set of utilities which supports the providers in indentifying and correcting errors. It is not the responsibility, nor is it efficient, to assign platform staff the task of correcting dataset errors/anomalies. The data providers are best equipped to handle changes that should be made through proprietary knowledge of their own infrastructure, drivers, constraints, etc. Should manual edits be required to integrate and spatially relate the provided data, this would be the responsibility of platform staff.

The initial QA/QC check is the most important step in this process, and it is critical that the provider is comfortable and willing to implement the processes and changes the regional platform requires for use in the platform. For first-time providers, this QA/QC process would be the most intensive. After a provider has made the necessary changes, the platform could readily integrate any changes or updates made by the provider over time.

The processes set forth in the acquisition procedures speak to the mechanisms that ensure the proper integration of provider data into the platform. What follows is a set of "best practices" for adding a dataset to the regional platform. When a provided data set is checked against these criteria and is considered valid, it will be ready for the next step of the Acquisition Procedures. The entire QA/QC process is based on timely communication between regional platform staff and the data providers. Roles and responsibilities are outlined in Appendix E.

A QA/QC checklist would be used to identify the following:

- Unique Identifier attribute for each feature
- Unique Identifier attribute for the provider
- Missing/wrong attribute information
- Overlapping geometries in the features
- Attribute fields crosswalk to the platform's schema
- Correct coordinate system/projection
- Current metadata
- Dataset edge matched to "agreement points"
- Provider the best source for that data set
- Provider approves of the transformed data set

2.5. DATA BACKUP AND RECOVERY

The purpose of a data backup and recovery plan is to identify the minimum required recommendations for ensuring that a regional GIS platform is protected from hardware and software failures. Because this is a feasibility study investigating multiple hosting and hardware options, this plan is devised to establish recommendations, rather than establish detailed specifications for backup and recovery. It is likely that the host organization that is chosen to house a regional GIS platform will have existing backup and recovery measures in-place. As long as the measures in-place meet the minimum recommendations, they may be considered acceptable to adopt.

A number of possible scenarios could lead to data loss.

- Data or database elements could be accidentally deleted.
- Data could be corrupted by the addition of corrupt data.
- Hardware, such as a disk or server, could fail.
- Disasters, such as flooding, could destroy a server and storage media.

Since much time, effort, and money may be invested in a regional GIS platform it is critical that a tested recovery plan is in place. This plan should be tested before it is implemented to ensure that a successful recovery can be performed.

Automated procedures should be used as much as possible to minimize the workload and ensure the scheduled frequency of backups. The use of commercial back-up software, such as Symantec's Back-up Exec or Microsoft's Data Protection Manager, can be used to perform file-level back-ups. Database backups can be automated through SQL Server jobs or the SQL Server maintenance wizard.

This plan recommends using a combination of tape and external/portable hard drives for backups. This hardware will allow for a Disk-to-Disk-to-Tape backup system, where redundant backups are performed to both media types. The tapes will be utilized for long term historical backup, and the external/portable hard drives will be used for short term, on site backup. The

Regional GIS Platform host can utilize existing hardware as long as it is ensured that backup and recovery operations are successfully tested.

The operating system (Windows Server 2008) and installed applications (ArcGIS Server, SQL Server and associated applications) should start with a full backup followed by differential nightly backups (on-site). The differential backups can be set to only write files that have changed since the previous backup session. Once a week, a full backup (either on a tape or external/portable hard drive) should be taken off site for storage. Because these applications can be restored from the original installation disks, it is not necessary to keep historic versions of backups. Based on this, older off site backups can be overwritten with newer versions if needed. For example, execute a backup on the last day of week and swap drives with the last period's backup at the offsite location.

Any custom applications developed for a regional GIS platform can be included in the operating system backup.

It is anticipated that the majority of the spatial data housed by a regional GIS platform will reside in SQL Server geodatabases. In addition, there may be other non-spatial datasets associated with the GIS platform (e.g. blog's, user comments, forums). These will be considered mission critical; currency and efficient recovery times from the backups are essential. For those datasets that undergo frequent data changes and updates, regular backups will be performed based on the following recommendations:

For static data with infrequent data modifications (e.g. orthophoto's, general base layers):

- Full backups every 6 months (to tape and/or external/portable HD)
- Differential backups nightly
- Full backups after every complete update event

For frequently modified datasets (e.g. parcel fabric, model outputs, user feedback)

- Full backup to tape nightly
- Full backup to external/portable HD (for offsite storage) weekly

As discussed, the recovery systems should be tested during initial setup to ensure a successful system or data recovery in the event of a loss. In all cases, the most recent backup copy will be used for recovery. It will be the responsibility of the regional GIS platform host to review all backup logs at least once a week to identify any errors.

3. PHASE 2 - HARDWARE, SOFTWARE AND USER INTERFACE

As defined in the Request for Proposal for this feasibility study, the regional GIS platform is intended to:

> "...house and make available regional GIS datasets generated via the regional blueprint process and to assist the SCRTPA in meeting the new metropolitan planning organization (MPO) directives set forth by SB375.
>
> While the provided scope of work is targeted at meeting these near-term purposes and objectives, the overall project architecture shall be designed with an eye toward future expansion, including additional types of data, geographic areas, and technical applications."

Based on this understanding, this feasibility study identifies and recommends the best solution for data storage location, hardware, software, and user interface options. The approach to be used follows this order:

(1) Identify the most suitable software package based upon required analysis outputs and data storage/retrieval needs,
(2) Determine hardware requirements for the software, and
(3) Identify the best suited location to house and manage a regional GIS platform.

Conceptually, a regional GIS platform could be developed to provide a range of different levels of functionality. Establishing a clear understanding of the requirements of the platform is fundamental to establishing a framework in which evaluations and recommendations can be made.

3.1. FUNCTIONALITY

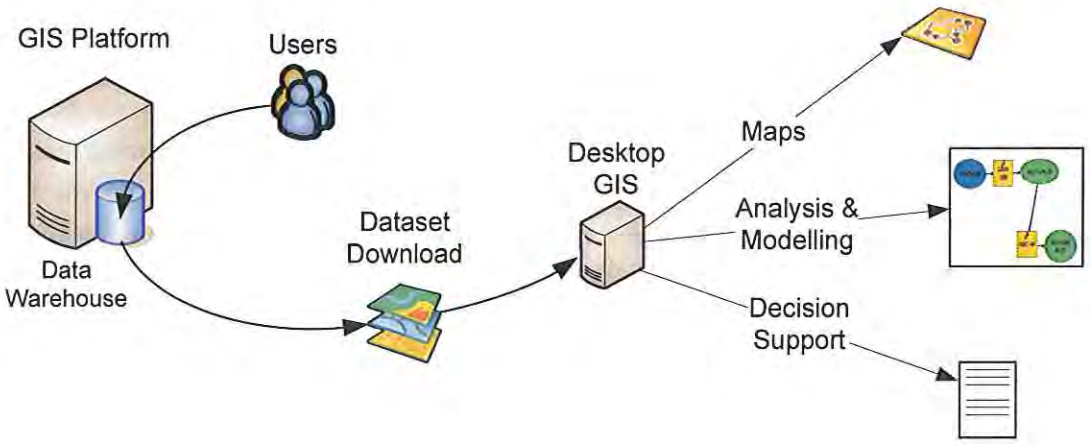
3.1.1. LEVEL 1 FUNCTIONALITY

At a minimum level of functionality, the Shasta Regional platform could serve as a data warehouse, housing and making available:

- Source data from the different data providers,
- Regionally merged and generalized data, and
- Newly developed data needed for regional planning projects.

At this level (Level 1), datasets could be made available for download via FTP, without the requirement of a user interface for serving maps via a web facing application. It would be the responsibility of the user to obtain the most recent version of a dataset. Because the functionality of this option would be limited to data warehousing and download, use would be limited to users with their own GIS systems, which would largely exclude the general public as potential users.

Diagram 1: Conceptual Model of a Level 1 Regional GIS Platform.

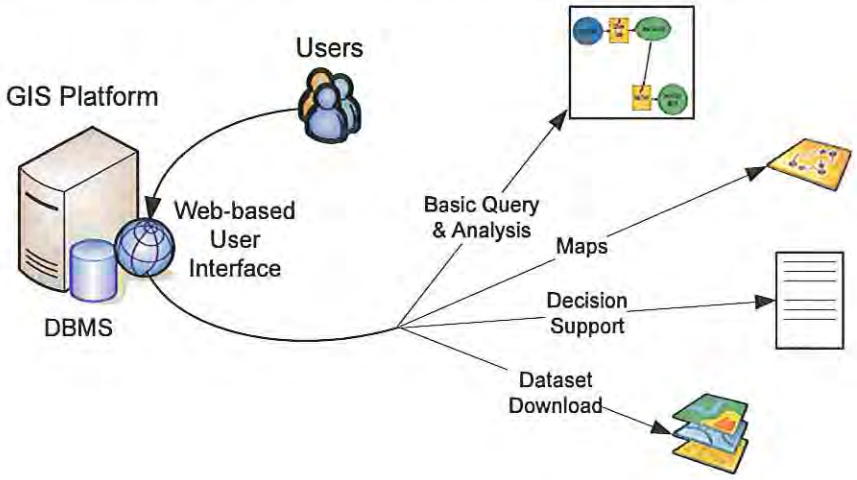


3.1.2. LEVEL 2 FUNCTIONALITY

At the next level of functionality (Level 2), a user interface is added to a regional GIS platform to allow for web-based viewing, basic query and analysis of the data. This level of functionality is frequently used by government agencies, such as planning and public works departments, often times providing public access to non-sensitive data.

Both the City of Redding and Shasta County currently support websites that provide their data via file transfer protocol (ftp) sites (Level 1) and allow viewing and basic query and analysis (Level 2) through public facing websites.

Diagram 2: Conceptual Model of a Level 2 Regional GIS Platform.



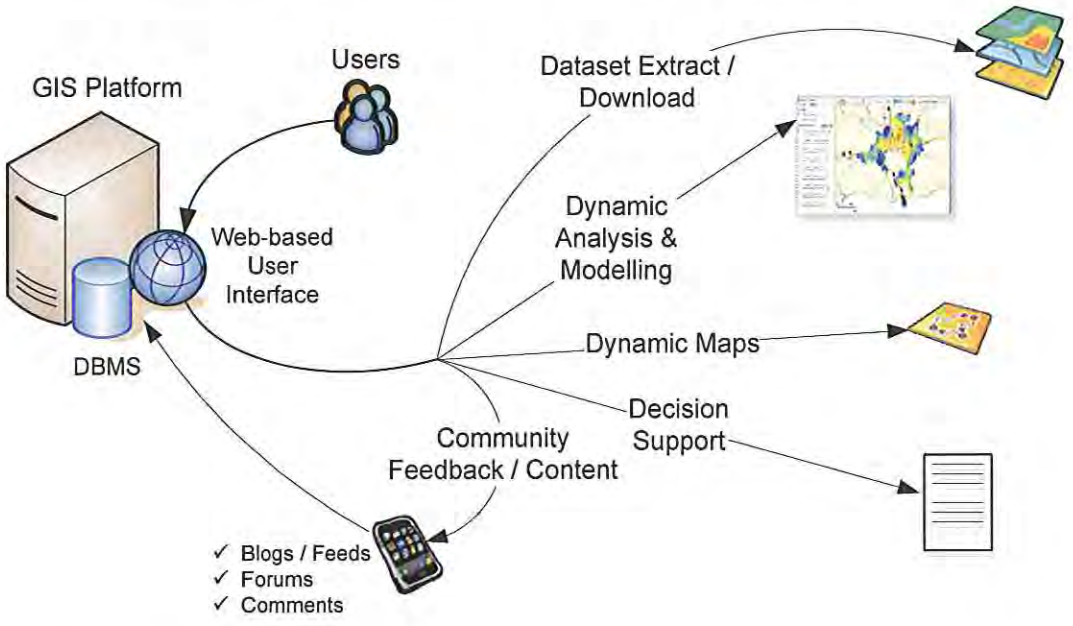
3.1.3. LEVEL 3 FUNCTIONALITY

At this point, however, the City and County do not provide spatial analysis, decision-making support, or the framework to develop custom tools and applications. It is this next level (Level 3) of a regional GIS platform functionality that is required to meet the SCRTPA's anticipated and planned applications.

At Level 3, web mapping applications are attractive, fast, and easy to use by their intended audience. At this level of functionality, map services play an important role. Technical users could use regionally merged and standardized datasets through two methods: by downloading the data to their local machine or by consuming map services authored by platform staff. Authored basemap services are high-performing and provide a common looking digital map of the region. The platform itself could consume map services authored by data providers whose data is static through modeling and analysis procedures. By using map services, the most recent and up to date data from authoritative sources is used, eliminating the need for storing data locally.

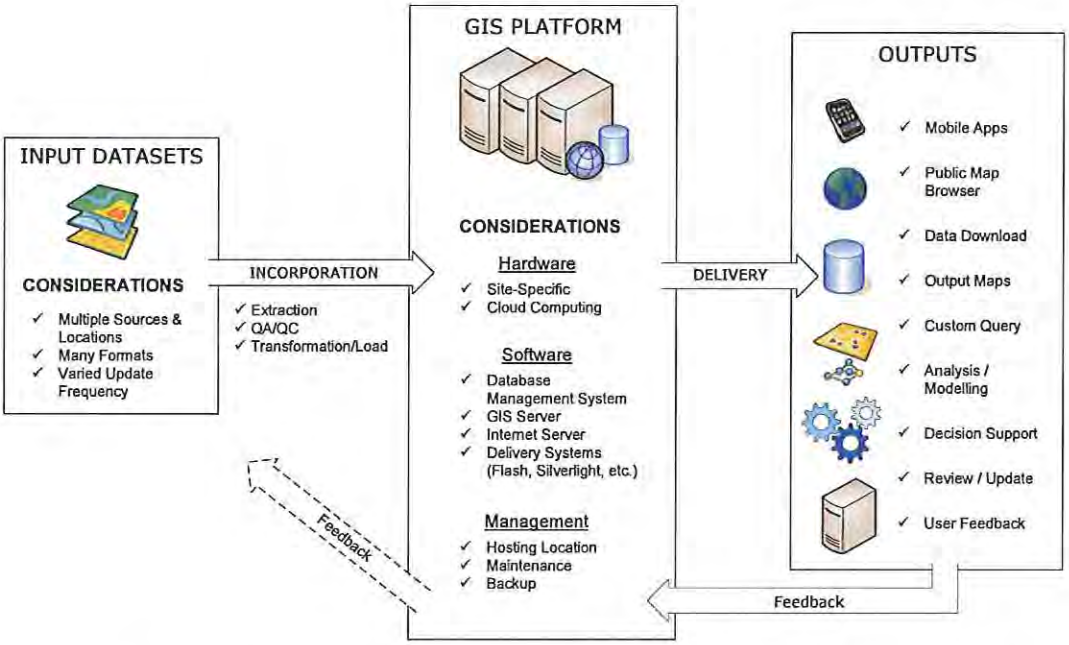
In addition, this level could support mechanisms for user feedback or commenting. This feedback could provide the public with the opportunity to become participants in the planning process, giving input on the accuracy of datasets, identifying information gaps, and potentially providing a gateway for users to submit location-based comments or suggestions.

Diagram 3: Conceptual Model of a Level 3 Regional GIS Platform:



3.2. DATA FLOW

Before considering options for software, hardware, and host locations, it is important to have an understanding of how GIS data would "flow"; from the data provider, into a regional GIS platform, and ultimately out of the platform to the user. The following diagram is a conceptual view of the data flow process:



In many cases, the best solution for a portion of this diagram (i.e. hardware storage or GIS server software), is interdependent upon the recommendations made in other parts of the diagram. Thus, recommended solutions are those that provide the best combination(s) of tasks to provide a robust, easy to implement system with potential for future growth.

The following sections evaluate and recommend options for Software/User Interface, Hardware, and Regional GIS Platform Host. The Software/User Interface is evaluated first, since the recommended solution will help determine the requirements for both the Hardware and Host options.

Where applicable, cost estimates are provided to assist in the evaluation. These cost estimates include software product quotes, hardware and operating system quotes and staffing and resource estimations for hosting a regional GIS platform. It is appropriate to use these cost estimates for comparing options and identifying recommendations. It is not appropriate to use them for generating exact budget amounts required for the ultimate procurement, setup, and management of a regional GIS platform.

3.3. SOFTWARE OPTIONS

Because of the wide array of input, storage, and output needs for a regional GIS platform, the optimal server software will need to be flexible and feature rich. While there are an ever-expanding number of software applications available for providing GIS information via the internet, many do not include the full range of capabilities anticipated for a regional GIS platform. It is important that the software chosen has proven capabilities for the broad requirements needed for the platform. Another important consideration is the amount of effort required to produce a product that meets all the needs of the platform. The ideal product will incorporate most needs out of the box without:

- Time-consuming programming,
- Training to bring staff up-to-date on software configuration, or
- Requiring multiple plug-ins for extensible tools.

An important consideration when reviewing software options are the mechanisms for interacting and managing the data. Some software products include a database management system (DBMS) formatted specifically for the product (i.e. ArcGIS uses the ArcSDE technology to directly manage spatial data in a relational DBMS). Conversely, some products may include compatibility for the most common GIS data formats, but may not allow for direct editing or updating of those formats.

3.3.1. SOFTWARE REQUIREMENTS

Based upon the short-term goal to use a regional GIS platform to assist the SCRTPA in meeting SB37S directives, it is anticipated that it will house and run the following GIS server-based applications and spatial analysis tools:

Application	Requirements
DecisionTree	▪ MS Windows Server 2003 or later ▪ Esri ArcIMS or ArcGIS Server or another WMS-compliant mapping engine ▪ SQL Server relational database
Spatial analysis tools	▪ Esri ArcGIS Server, with Spatial and Network Extensions

DecisionTree is a third-party web-based application designed to weight multiple geographic factors to generate maps highlighting optimal locations maps. It is compatible with Web Map Service (WMS)-compliant mapping engines including Esri server software. It does utilize the ArcGIS Geoprocessing Toolbox (a workstation-based toolset for ArcInfo) to generate layers for inclusion in DecisionTree.

GIS-based spatial analysis tools will be used by the SCRTPA to guide the SCS process. Because these tools require Spatial and Network extensions, a licensed copy of ArcGIS Advanced Enterprise would be required for on-the-fly modeling within a server environment.

There is a potential for additional applications to utilize datasets housed on the platform, but these application are desktop applications:

Application	Requirements
iPLACE^{3}S	ArcGIS 9.x or 10 (desktop)
UPlan	ArcGIS 9.x or 10 (desktop) with Spatial Analyst Extension and MS Excel.

In addition to these specific applications, there are general requirements that the platform software needs to meet:

- Compatibility with most common GIS data formats, and
- Conformity to State or local standards.

Because Esri's ArcGIS software is required and/or compliant with these applications, it is considered the benchmark software in this study. In the initial review of options, ArcGIS Server software is compared to other options in terms of analysis, out-of-the-box capabilities, data access and management, and customization.

The following matrix identifies options evaluated for software alternatives. Note that this review is based upon the best available information gathered from software websites, user forums, and conversations with sales staff. In some cases, assumptions were made based upon this information relative to the software's capabilities. The software alternatives are further described in Appendix F.

SOFTWARE USER INTERFACE OPTIONS	Meets Level 1 & 2 Platform Requirements	Meets Level 3 Platform Requirements	Built-in Map Printing	Search and Query	Common Data Formats	ESRI GeoDatabase Compatible	WMS Output	KML Output	Data Feedback/Editing Mechanisms	Open Source	Compatible w/ Hardware Options (on-site & cloud)	Support for Mobile Applications	Extendable
ArcGIS Server	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Caris Spatial Fusion Enterprise	Y	N	Y	Y	Y	Y(A)	Y	Y	N	N	Y	Y(A)	Y(A)
GeoServer	Y	N	Y(A)	Y	Y	Y(A)	Y	Y	Y(A)	Y	Y(A)	Y(A)	Y(A)
GISCloud	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Google Earth Enterprise	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y(A)
Manifold IMS	Y	N	Y(A)	Y(A)	Y	Y	Y	Y	Y(A)	N	N	Y(A)	Y(A)
MapDotNet UX	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
MapGuide	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y(A)	Y	Y

Y	Yes - Out of the box capability
Y(A)	Yes - May require additional customization, plug-in, or programming
N	No

3.3.2. SOFTWARE RECOMMENDATION

Based upon the software requirements and the results of the options analyzed in this evaluation, Esri's ArcGIS Server is the recommended software product. This recommendation is reinforced by the following factors:

- Market share – Esri products currently have the majority of the GIS market.
- Product familiarity and expertise – most GIS professionals have first-hand knowledge in the use of Esri software.
- Compatibility – ArcGIS Server can readily accommodate the differing data formats that exist between data providers.
- Out of the box implementation – ArcGIS Server comes with all of the essential utilities required by the platform, without requiring additional programming or customization.

With this recommendation, the Hardware and Hosting Locations options are evaluated based upon their ability to accommodate a platform running ArcGIS Server.

3.4. HARDWARE OPTIONS

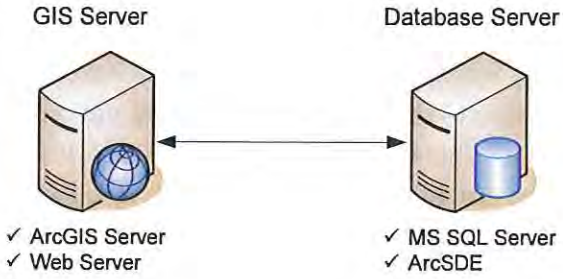
Two hardware options were considered for a regional GIS platform: On-Site servers and Cloud Computing-based servers. Both options are comparable in terms of capabilities and performance while running ArcGIS Server. The only difference is in the availability of options for vendors – while there are many choices for purchasing on-site hardware; there is currently only one option for running ArcGIS Server in the cloud. The hardware alternatives are further described in Appendix G.

POTENTIAL HARDWARE OPTIONS	Expandability	Manufacturer Options	Warranty	Support	Security
On-site Server	M	G	G	G	G
Cloud Computing	G	P	G	G	G

G	Good performance / wide array of options available
M	Moderate performance and options
P	Limited options available

3.4.1. HARDWARE CONFIGURATION

The recommended configuration for the initial version of a regional GIS platform includes two servers; one to house the GIS server software, and one to house the relational database (which would include spatial and tabular data).



Both the On-Site and Cloud Computer options can accommodate this configuration. The most significant differences between these options occur when considering costs, both in terms of initial setup, and the long term expenses.

3.4.2. HARDWARE RECOMMENDATIONS

While both options are fully capable of running a regional GIS platform, ultimately, the decision for a recommendation comes from the availability of long-term funding. The most likely funding source for the initial purchase and startup of the platform would be grant-funded or as an in-kind match to grant funding. It is unlikely to find a funding source that would be able to accommodate an annual, long-term budget for a Cloud-Computing based platform. For these reasons, the On-Site Server option is the recommended solution.

3.5. HOSTING OPTIONS

Seven potential entities were reviewed in the initial investigation of hosting locations. These represented various levels of governance (State, County, and Local), in addition to private, third party hosts. The following matrix compares the options in terms of their hosting capabilities, which are discussed in more detail below.

INITIAL REVIEW OF POTENTIAL PLATFORM HOSTING LOCATIONS	Capable of Level 1 and 2 Hosting	Capable of Level 3 Hosting	Resource (Staffing) Capabilities	Local	Network Bandwidth	Physical Security	Facility Access	Backup and Recovery Service
Cal-Atlas	Y	N	Y	N	Y	Y	N	Y
City of Redding	Y(A)	Y(A)	Y(A)	Y	Y	Y	Y	Y
SCRTPA	Y(A)	Y(A)	Y(A)	Y	Y	Y	Y	Y(A)
Shasta College	Y(A)	Y(A)	Y(A)	Y	Y	Y	Y	Y
Shasta County	Y(A)	Y(A)	Y(A)	Y	Y	Y	Y	Y
Third Party - remote (e.g. ESRI-Amazon, Geocortex)	Y	Y	Y	N	Y	Y	N	Y
Third Party - local (e.g. VESTRA Resources Inc.)	Y(A)	Y(A)	Y(A)	Y	Y	Y	Y	Y

Y	Yes - Resource is on-hand and available
Y(A)	Yes - Resource may require additional staffing or funding
N	No

3.5.1. IN-DEPTH EVALUATION OF HOSTING LOCATIONS

Using the results from the initial investigation of hosting locations (further described in Appendix H), a short-list of the most promising options was identified for a more in-depth evaluation. These locations include the City of Redding, Shasta College, Shasta County (with the option of a joint hosting/management between Shasta County IT/GIS and SCRTPA), and VESTRA. The first step in this evaluation involved the creation and submission of a Potential Data Host Survey (see Appendix I) designed to identify the willingness and capability of a host to accommodate a regional GIS platform. Results of this survey and direction consultation with potential hosts were utilized to arrive at a recommendation.

Both the survey and follow up questions asked for cost estimates for the startup and management of the platform. Note that these costs are estimates and are used within this feasibility study for comparison and for recommendations. These costs are not to be interpreted as inclusive of actual costs that would occur when a host is chosen and the GIS platform is implemented. It should also be noted that costs are only one of the factors considered in determining a host for the platform. Of equal or potentially greater importance are factors such as demonstrated experience, accessibility to future funding opportunities, and potential for a positive impact upon the regional community.

3.5.1.1. CITY OF REDDING

The City of Redding currently has ArcGIS Server (9.3.1) and SQL Server (2005 Enterprise), which is used internally within the City. The City has an adequate facility to house a regional GIS platform server hardware.

If the City were to assume the management responsibilities of a regional GIS platform, it would need additional funding to support this. Startup costs would require the purchase of server hardware and associated upgrades to accommodate the additional resources. The City has an existing ArcGIS Server license, but because of licensing restrictions and resource demands, it is assumed an additional license would be required for regional GIS platform servers.

Following discussions with Devon Hedemark (City of Redding IT Supervisor – GIS), the city does not have the necessary hardware and mechanisms in place to host a regional GIS platform. As a result, the city withdrew its interest in hosting the platform.

3.5.1.2. SHASTA COLLEGE

Based upon results from the Potential Data Host Survey and conversations with Douglas Meline (Associate Vice President of Information Services and Technology) and Dan Scollon (GIS Instructor), Shasta College is interested and willing to house a regional GIS platform hardware/software at their data center facility. Shasta College's data center offers the best available facility within the

study area, with features such as a raised floor, backup generator, and a 1 gigabyte internet connection.

In addition to the capabilities of the data center, Shasta College offers a unique setting where students and the community could participate in the setup and management of a regional GIS platform. This does present some logistical issues when dealing with a revolving door of students, requiring a continued need for educating those involved with the platform. In addition, the management of the platform would have to be the responsibility of a permanent Shasta College staff member, through the SCRTPA, or third-party staff. The benefits of this setting can be far reaching within the community, where students can gain hands-on experience with advanced GIS concepts and contribute labor for routine works tasks and maintenance activities.

Startup costs would include the purchase of hardware for the GIS and Database Servers, in addition to hardware and software requirements for backups and management of a regional GIS platform as a separate entity within the facility. ArcGIS Server software can be obtained through the college's educational license at a much reduced rate ($2,000 per year, which would include an Enterprise Advanced Server license with all extensions included). Based upon conversations between VESTRA and Esri, it would be allowable to utilize this license for a regional GIS platform. If this option is utilized, it would represent significant initial and ongoing maintenance cost savings.

Staffing costs were estimated at $32.17 to 37.98 per hour for IT support (IT Engineer) and $44.80 to $62.72 per hour for GIS support (Adjunct Faculty).

3.5.1.3. SHASTA COUNTY / SCRTPA

Shasta County has ArcGIS Server (9.3.1) and SQL Server (2008 Standard), and uses these for both internal and public facing web sites. The County also has an adequate facility to house a regional GIS platform server hardware. It is possible a regional GIS platform could be housed on the County's existing hardware.

Any agreement with the County to provide hosting would require input from the IT Department and approval from the County Board of Supervisors. If the County were to assume the management responsibilities of a regional GIS platform, it would need additional funding to support this. Startup costs would require the purchase of server hardware and associated upgrades to accommodate the additional resources. Shasta County has an existing ArcGIS Server license, but because of licensing restrictions and resource demands, it is assumed an additional license would be required for regional GIS platform servers.

Staffing costs were estimated at $87.90 per hour for both IT support and GIS support (based upon current 2010/2011 fiscal year budgeted rates.

3.5.1.4. VESTRA RESOURCES INC.

VESTRA has implemented numerous ArcGIS Server and SQL Server systems for clients at many levels of government. VESTRA has an adequate facility to house a regional GIS platform server hardware.

If VESTRA were to assume the management responsibilities of a regional GIS platform, it would need contract funding to support this. Startup costs would require the purchase of server hardware, software and associated upgrades to accommodate the additional resources.

Staffing costs were estimated at $115 per hour for IT support and $105 per hour for GIS support.

3.5.1.5. HYBRID OPTION

A final option for hosting a regional GIS platform would be a hybrid partnership. Options for this can vary, depending upon the entities involved and funding availability. For example, the initial setup could be at a third party location, ultimately to be transferred to the SCRTPA or County for long-term management.

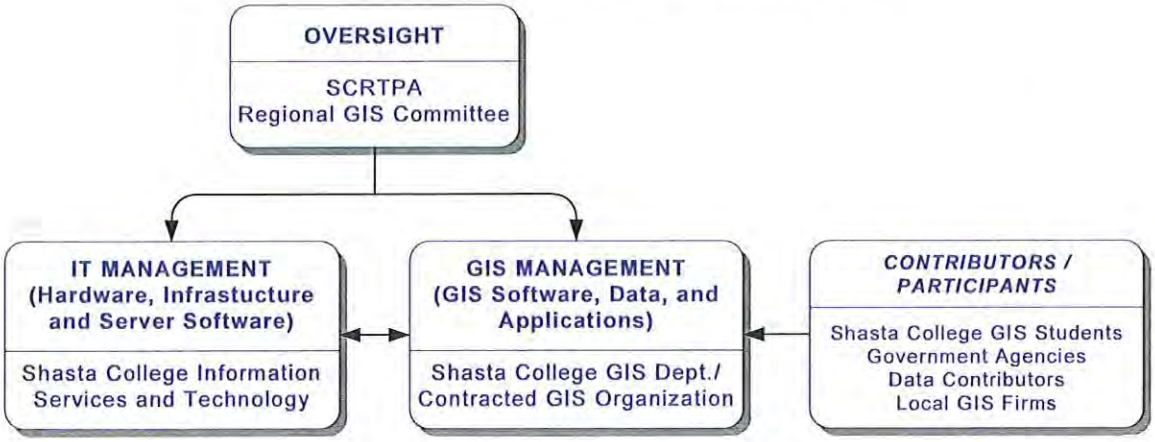
3.5.2. HOSTING RECOMMENDATIONS

Shasta College is the recommended host location based on the following considerations:

- Facility – In comparison with all other host options, Shasta County offers the best facility for housing the platform's hardware. The data center facility also has a 1 gigabyte internet connection, the best available in all local hosts evaluated.
- Reduced software costs – Based on the understanding that a regional GIS platform could utilize the college's educational license, which includes ArcGIS Advanced Server at the cost of $2000 per year. This represents a huge cost savings compared to the standard $40,000 initial cost and $10,000 annual maintenance cost.
- Funding opportunities – As an educational facility, Shasta College may be able to utilize additional grant funding options compared to Agencies or third party hosts. An example of this is the College's recent grant award from the National Science Foundation for a Geospatial Education Collaborative. Part of the grant proposal is for GIS work to be completed on community projects.
- Community Benefit – By increasing the capabilities of the existing GIS program at Shasta College, there are numerous benefits to the local community. More specifically this option will:
    - Provide a resource for students and the community to obtain hands-on experience with cutting edge technology;
    - Function as a gateway for multiple levels of government and private industry to share datasets, knowledge, and resources;
    - Assist Shasta College in developing a niche of GIS education, both within the region and within the State; and

- Potentially provide a source of education for a profession that continues to gain market share within the technology industry.

As a regional GIS platform matures, the roles and requirements for management may change. The following diagram depicts the initial recommended management responsibilities and supporting roles of a regional GIS platform:



The administration and responsibility of the platform falls under the SCRTPA. Assuming resource availability, the SCRTPA will continue to fund the implementation and on-going maintenance of the platform. Consistent with the concept of a regional project, however, the management of the platform's various elements and applications could, over time, be assumed in part or whole by local stakeholders.

Under this option, the housing and maintenance of the server hardware, overall infrastructure of the system, and system integrity could be performed by the Shasta College Information Services and Technology Group. The GIS platform management would be a joint effort by a GIS organization under contract with the SCRTPA and Shasta College via the GIS department. Options for the contracted GIS organization include one or more government-employed GIS professionals, a local GIS firm, or possibly through a hybrid group of GIS professionals (such as FNRGC). Because of the advanced-level, technical topics that will be required for the management of the platform, the party responsible needs to have demonstrated experience and knowledge in order to successfully implement and maintain a regional GIS platform.

With a regional GIS platform hosted at the College, a number of contributors and participants can be included. Students in the GIS program may be able to assist with management and development. Government Agencies and local GIS Firms and organizations can act as data contributors, in addition to possibly custom application development.

3.6. USER INTERFACE

Based upon the recommendation to use ArcGIS Server software, there are a number of considerations to be made with the initial development of the platform's GUI interface. Several

options exist, including Web Application Development Framework (Web ADF), and Application Program Interfaces (API), which include JavaScript, Flex, and Silverlight. Appendixes J and K offer further insight into recommended development environments.

3.6.1. WEB ADF

Web ADF is a good performer, but the JavaScript, Adobe Flex, and Microsoft Silverlight APIs for ArcGIS Server have markedly better performance. In addition, it appears that Esri is moving away from WebADF applications, based on their Depreciation Plan for ArcGIS 10 and 10.1, which states:

"The 10.1 Web ADF applications will only support local connections to Server versions prior to 10.1. We recommend developers using local connections for accessing fine-grained ArcObjects migrate their business logic to Server Object Extensions. For Web ADF based editing applications (all of which use Local connections), we urge users to look at alternative web editing tools based in the ArcGIS Web Mapping APIs."

For this reason, the feasibility study recommends that the Web ADF platform not be used in any development of applications for a regional GIS platform.

3.6.2. JAVASCRIPT API

The JavaScript API does not require browser plug-ins, which are requirements with Flex and Silverlight API's. In addition, the ArcGIS JavaScript API takes full advantage of mapping, geocoding, and geoprocessing services.

3.6.3. REST-BASED ARCHITECTURES

Representational State Transfer (REST) is a style of software architecture that dramatically simplifies and streamlines communications between web-based software components and, is therefore, particularly well-suited for hyper-media rich internet applications. Adobe Flash and Microsoft Silverlight are multi-media software platforms that are used to create rich Internet applications that incorporate graphics, animations, and video. These applications can manipulate vector and raster graphics, merging both seamlessly, and support bi-directional streaming of both audio and video. Both platforms incorporate a browser-based applet (installed on the client as an extension to the browser) that incorporate client-side caching which can dramatically improve the overall throughput for which graphics are processed.

Note: REST is also compatible with other web-based technologies like JavaScript and can also be incorporated into non-internet applications. REST is not a specification or standard. Systems which follow REST principles are often referred to as "RESTful."

When all of these technologies are used together as they were intended, the result is a web-based application with a use friendly interface that communicates effectively with web-based services that efficiently stream and blend vector and raster graphics to the client. Thus, this particular blend of technology is a perfect marriage for web-based GIS.

3.6.3.1. FLEX (FLASH) VERSUS SILVERLIGHT

Although Adobe Flash has a huge install base plus a technological lead in many areas, it is our prediction that Microsoft Silverlight will be the ultimate winner in the government and business world where Microsoft technology is most prevalent. In other words, to a large extent the open-source community will continue to adopt Flex/Flash and .NET programmers will increasingly (naturally) adopt Silverlight.

Although Esri is likely to eventually support both Flex and Silverlight (perhaps others) with full WebADF-style functionality, the vast majority of the Esri development team uses Visual Studio. Plus, Esri has historically had a very close relationship with Microsoft. Knowing where much of the development energy will likely go in the future (and where Esri users will obtain the most benefit) has been fairly easy to predict.

4. IMPLEMENTATION PLAN

The implementation plan is a framework to guide the SCRTPA and partnering entities (Shasta College, agency staff, and contracted GIS organizations) in the realization of the recommendations described in the feasibility study. As a financially constrained project, the most easily attainable and highest priority tasks are the focus of the implementation plan.

The major project phases are outlined below. Each project phase is explained in further detail in the following sections.

- IT System Setup
- Data Management
- Map Services and Web Viewers
- Platform Maintenance

4.1. IT SYSTEM SETUP

The recommendation for Regional GIS Platform design is to implement ArcGIS Server (AGS) technology at Shasta College. It is further recommended that the initial implementation of a regional GIS platform be built on a virtual server at the college. In a virtual environment the early implementation of a regional GIS platform will conserve IT resources until such time that servers are purchased and resource allocation has been determined by the college. IT staff at the college currently use virtualization for applications unrelated to a regional GIS platform and have expressed interest in doing the same for a regional GIS platform. A concern was the cost of virtualization software. VM Ware is free virtualization software that members of GIS consulting firms use and can be implemented at the college.

Task – Develop virtual environment

- Responsibility – SCRTPA with a contracted GIS organization and Shasta College IT
- Funding Requirements – actual cost unknown at this time

Task – Install AGS in the virtual environment including ArcSDE on a virtual relational database management system (RDMS)

- Responsibility – SCRTPA with a contracted GIS organization and Shasta College IT
- Funding Requirements – actual cost unknown at this time

4.2. DATA MANAGEMENT

The recommendation for regional GIS platform data acquisition and management is to use basic GIS skills to acquire and update the data. Utilizing basic skills, as opposed to automated processes, encourages student involvement in the process and eliminates the need for a GIS programmer in the acquisition process. Scripts that automate the data acquisition and update process should be considered as:

- The platform develops over time,

- Additional funding sources become available, and,
- Potentially, students' skill levels advance through advanced classes at the college.

Considering student learning opportunities, the database that ultimately evolves to house the data can be replicated so that there is a learning environment and a production environment. That being said, it is recommended that the SCRTPA enter into a contract with a GIS organization to oversee the data management of the production environment. By doing so, the SCRTPA is addressing quality assessment and quality control. Initial loading of data into the Regional Standardization Guidelines, routine data updates, and new data acquisition needs to be managed by GIS professionals to ensure data integrity, update frequency and data maintenance and archives.

Task – Set up database with Regional Standardization Guidelines on ArcSDE at the College

- Responsibility – SCRTPA with a contracted GIS organization and Shasta College IT
- Funding Requirements – actual cost unknown at this time

Task – Initial data acquisition - load agency data into database

- Responsibility – SCRTPA with a contracted GIS organization and Shasta College student interns
- Funding Requirements – Pay for student interns and QA/QC by a contracted GIS organization

Task – Annual updates to existing agency data

- Responsibility – SCRTPA with a contracted GIS organization and Shasta College student interns
- Funding Requirements – Pay for student interns and QA/QC by a contracted GIS organization

Task – New regional data development for high priority data layers

- Responsibility – SCRTPA with a contracted GIS organization, Shasta College student interns, Regional GIS Platform Subcommittee
- Funding Requirements – Pay for student interns and QA/QC by a contracted GIS organization

4.3. MAP SERVICES AND WEB MAPPING APPLICATIONS

The impetus and priority of a regional GIS platform grew out of Blueprint and SCS planning efforts, mandated by the State of California. While a regional GIS platform can serve a large variety of the community issues, the recommendation is for the initial maps services and web mapping applications address the immediate needs of the SCRTPA in dealing with the development of a Sustainable Communities Strategy. Tasks outlined in the Sustainable

Communities Planning Grant Application submitted by the SCRTPA can serve as a starting point for defining the map services and web mapping applications.

Task – Priority map services for use by the SCRTPA staff

- Responsibility – SCRTPA with a GIS a contracted GIS organization
- Funding Requirements– SCRTPA staff and consultant time for on-call services

Task – Functionality needed in web mapping applications

- Responsibility – SCRTPA with a contracted GIS organization
- Funding Requirements – SCRTPA staff and a contracted GIS organization time for on-call services

4.4. PLATFORM MAINTENANCE

The Shasta Regional GIS Platform Subcommittee is made up highly experienced GIS professionals that are involved professionally and personally in diverse aspects of the community and the GIS industry. Their knowledge, input and support is invaluable in implementing a regional GIS platform. It is recommended that quarterly meetings be scheduled to give updates and seek input on major decisions from the subcommittee. Specifically, as the platform evolves, the subcommittee input is needed in affirmation of standardization guidelines, in existing data changes, and new data development procedures.

Task – Quarterly meetings of Shasta Regional GIS Platform Subcommittee

- Responsibility – SCRTPA
- Funding Requirements – can serve as in-kind match for grant application purposes

APPENDIX A – MEMORANDUM OF UNDERSTANDING BETWEEN COUNTY OF SHASTA AND CITY OF REDDING

MEMORANDUM OF UNDERSTANDING BETWEEN
COUNTY OF SHASTA AND CITY OF REDDING

This MEMORANDUM OF UNDERSTANDING ("MOU") is entered into between COUNTY OF SHASTA, a political subdivision of the State of California ("County"), and the CITY OF REDDING ("City"), a general law city organized under the laws of the State of California, for the purpose of sharing Geographical Information System ("GIS") data.

1. A technical committee consisting of City's GIS Manager ("Manager") and County's Information Technology Supervisor for GIS ("Supervisor"), and other personnel as designated by the Manager and Supervisor, shall develop common standards for the shared GIS data within six months of the effective date of this MOU. Standards shall include, but will not be limited to, tracking the source of information; establishing consistent naming of layers; establishing consistent data types; insuring the data is mutually transferable and useable; determining how the data will be transferred, and how often data systems should be updated. The standards shall be approved by both Manager and Supervisor, and followed by both the City and County in accordance with the industry and/or professional practices.

2. County and City agree that City and County may use data supplied by the other for their use. City grants to County and County grants to City a nonexclusive, nontransferable license for use of the data.

3. Except as required by the California Public Records Act, Cal. Govt. Code §6250 et seq., neither the City or County may give, sell, trade, or otherwise transfer the data, data systems or other forms of information to any other person or entity without the express, written authorization of the Supervisor or Manager respectively .

4. The failure of any party to enforce against the other a provision of this MOU shall not constitute a waiver of that party's right to enforce such a provision at a later time, and shall not serve to vary the terms of this MOU.

5. Any notice required to be given pursuant to the terms and provisions of this MOU shall be in writing and shall be sent first-class mail to the following addresses:

If to County:

Shasta County Administrative Officer
1450 Court Street, Suite 308A
Redding, CA 96001-1673

With a copy to:

Shasta County Chief Technology Officer
1450 Court Street, Suite 124
Redding, CA 96001-1656

Approved 2/16/10

C-5281

If to City:

City of Redding Mayor
PO Box 496071
Redding, CA 96049-6071

With a copy to:

City of Redding GIS Manager
PO Box 496071
Redding, CA 96049-6071

6. This agreement supersedes all previous agreements relating to the subject of this MOU and constitutes the entire understanding of the parties hereto.

7. No changes, amendments or alterations to this MOU shall be effective unless in writing and signed by both parties.

8. City and County shall each, during the entire term of this MOU, be construed to be independent contractors, and nothing in this MOU is intended nor shall be construed to create an employer-employee relationship, a joint venture relationship, or to allow one party to exercise discretion or control over the professional manner in which the other party performs the work or services that are the subject matter of this MOU.

9. County shall defend, release, hold harmless, and indemnify City, its elected officials, officers, and/or employees, from any and all claims for injuries or damages to persons and/or property which arise out of injuries or damages resulting from the negligent acts or omissions of County, its officers and/or employees. It is further agreed that City shall defend, release, hold harmless, and indemnify County, its elected officials, officers, and/or employees, from any and all claims for injuries and/or damages to persons and/or property which arise out of the negligent acts and/or omissions of City, its officers and employees. In the event of contributory negligence of County, its elected officials, officers, and/or employees, and City, its elected officials, officers, and/or employees, the liability for any and all claims for injuries or damages to persons and/or property shall be apportioned under the California theory of comparative negligence as presently established or as may hereafter be modified.

10. Notwithstanding the previous section, neither party shall be liable to the other party for loss or inaccuracy of GIS data or for any damage to information or equipment which results from the transfer of data from one medium to another.

11. If any claim for damages is filed with a party to this MOU or if any lawsuit is instituted concerning a party's performance under this MOU and that in any way, directly or indirectly, contingently or otherwise, affects or might reasonably affect the other party, the party receiving the claim or being served with the lawsuit shall give prompt and timely notice thereof to the other party. Notice shall be prompt and timely if given within 30 days following the date of receipt of a claim or 10 days following the date of service of process of a lawsuit.

12. During the term of this agreement, both parties may have access to information that is confidential or proprietary in nature. Both parties agree to preserve the confidentiality of and to not disclose any such information to any third party without the express written consent of the Manager or Supervisor, or as required by law. This provision shall survive the termination, expiration, or cancellation of this agreement.

13. This MOU is effective as of the date it has been signed by both parties and shall end 3 years later.

14. Each of the parties to this MOU shall observe and comply with all applicable federal, state, and local laws, ordinances, and codes that relate to the work or services to be provided pursuant to this agreement.

15. Neither City nor County shall discriminate in employment practices or in the delivery of services on the basis of race, color, creed, religion, national origin, sex, age, marital status, sexual orientation, medical condition (including cancer, HIV and AIDS) physical or mental disability or use of family care leave.

16. Either party to this MOU may terminate this MOU upon thirty (30) days' written notification to the other party. Either party may terminate this MOU immediately upon oral notice should the terminating party's funding cease or be materially decreased during the term of this MOU. If a party breaches this MOU or fails to perform its responsibilities pursuant to this MOU, the other part may terminate this MOU immediately upon giving oral notice.

IN WITNESS WHEREOF, County and City have executed this MOU on the day and year set forth below.

CITY

Date March 3, 2010

By: PATRICK JONES, Mayor
City of Redding

ATTEST:

PAMELA MIZE, City Clerk

FORM APPROVED:
RICHARD A. DUVERNAY
City Attorney

By: BARRY E. DeWALT

COUNTY

Date 2/26/10, 2010

LAWRENCE G. LEES
County Administrative Officer
County of Shasta

Approved as to form:

MICHAEL A. RALSTON
Interim County Counsel

By: JAMES ROSS
Senior Deputy County Counsel

RISK MANAGEMENT APPROVAL

By: JONATHAN HILL
Risk Management Analyst III

APPENDIX B – STANDARDIZATION DEFINITIONS

Several different terms are used to describe the processes and structure of data integration. The data definitions below provide a useful common vocabulary for use in the development of a regional GIS platform. The terminology was acquired from MetroGIS, a regional GIS serving the Minneapolis/St. Paul area (http://www.metrogis.org/data/standards/address_guidelines.shtml).

STANDARD

- a definite rule, principle or measure
- established or formally sanctioned by an authorized body
- requiring adherence from all organization statutorily obligated to do so

CONVENTION

- a general agreement about basic principles or procedures
- some written description of the agreement is usually prepared
- a convention can become a standard if formally sanctioned by an authorizing body

GUIDELINE

- a recommendation that is developed to detail a proposed practice or procedure developed for 'in-house' use
- no formal or semi-formal agreement to comply with a guideline is necessary
- a guideline can evolve to a convention if adopted by a larger user community

APPENDIX C – DATA SCHEMAS

REGIONAL STREET CENTERLINE

Field Name	Type	Description
Shape	ESRI_SHAPE (Binary)	The shape field contains geometry information.
Unique_ID	Long Integer	System ID for records of this table. Each numeric value is unique.
Reg_UID	Long Integer	Unique ID that persists.
PrefixType	String	Prefixed street type (e.g. Avenida, etc.)
PrefixDir	String	Prefixed street direction (e.g. S in 'S Main St').
StreetName	String	Primary name of the street segment.
StreetType	String	Type of street (e.g. st, ave, blvd, etc.)
SuffixDir	String	Street direction as suffix (e.g. West in 'Embarcadero West').
FullStreet	String	Fully specified name of the street segment (e.g. 'S Main St.').
LF_Actual	Long Integer	Beginning actual left address for the segment
LT_Actual	Long Integer	Ending actual left address for the segment
RF_Actual	Long Integer	Beginning actual right address for the segment
RT_Actual	Long Integer	Ending actual right address for the segment
LF_Exhaust	Long Integer	Beginning exhaustive left address for the segment
LT_Exhaust	Long Integer	Ending exhaustive left address for the segment
RF_Exhaust	Long Integer	Beginning exhaustive right address for the segment

Field Name	Type	Description
RT_Exhaust	Long Integer	Ending exhaustive right address for the segment
CityLeft	String	City on the left of the segment
CityRight	String	City on the right of the segment
ZipLeft	String	Zip code on the left of the segment
ZipRight	String	Zip code on the right of the segment
CountyLeft	String	County on the left of the segment
CountyRight	String	County on the right of the segment
TravelDirection	String	Indicates allowable travel direction. FR for 'from node' to 'to node', TO for 'to node' to ' from node', and BH for both directions.
Status	String	Status of the segment (e.g. existing or planned). A segment entered in the database before the roadway is built would have the status of planned.
Length_Cal	Long	Calculated length of the segment.
LengthSource	String	Length collection method (e.g., GIS, field, other database, etc.)
NameValidation	String	Indicates whether, or not the street name used should be validated. When a street name is not found in the master street name table, users may be allowed to type in the name while entering a new record by indicating that the name must be validated later on.
IsBoundary	Short Integer	Indicates whether or not the segment runs along jurisdiction boundary.
Source	String	Indicates which agency/department has entered the data. This helps in identifying the responsible party for the data.
Method	String	Indicates how the data was collected. This information will help in understanding the quality of data.
CFCC	String	Functional classification of street segment based on census feature class codes (CFCC).
DateEntered	String	Date when the segment was first created in the database.
DateUpdate	String	Date in yyyymmdd format of most recent segment spatial change

Field Name	Type	Description
Ac_Date	String	Date in yyyymmdd format of most recent segment attribution change
Qc_Exhaust	String	Flag indicating entity responsible for exhaustive range
County_FC	String	Functional classification of street segment type.
Private	String	Flag indicating whether it is a privately maintained road.
Speed_Limit	Short Interger	Speed limit for section of road.
Lanes	Short Integer	Number of lanes present for section of road.
Bike_Class	Short Integer	Signifies the bike classification status of a road segment.
No_Bike	Short	Restriction of bikes for road segment.

REGIONAL PARCEL

Field Name	Type	Description
Shape	ESRI_SHAPE (Binary)	The shape field contains geometry information.
Unique_ID	Long Integer	System ID for records of this table. Each numeric value is unique.
Reg_UID	Long Integer	Unique ID that persists.
Parcel_ID	Long Integer	Assessor parcel number.
Owner_Classification	Long Integer	Coded value indicating type of ownership.
Owner_Managing_Agnecy	String	
Improvement_Flag	Long Integer	
Improved_Value	Long	Value of improvements to the parcel.

Field Name	Type	Description
	Integer	
Land_Value	Long Integer	Value of physical land defined by the parcel boundary.
Total_Assessment	Double	Total assessed value.
Tax_Mailing_Address	String	
Parcel_Street_Address	String	
Subdivision_Name	String	
Parcel_Acreage	Double	
Parcel_Zoning	String	
SplitZoning_Flag	Long Integer	Flag to indicate if the parcel has split zoning.
Taxability	Long Integer	Taxability code.
Ex_LU_Code	Long Integer	Existing land use code.
Ex_LU_Descr	String	Description of existing land use.
Vacancy	Short	Flag to indicate whether the parcel is vacant or not.
Public_Parcel_Name	String	
Update_Date	Date	
Steward	String	

REGIONAL ADDRESS POINTS

Field Name	Type	Description
Shape	ESRI_SHAPE (Binary)	The shape field contains geometry information.
Unique_ID	Long Integer	System ID for records of this table. Each numeric value is unique.

Field Name	Type	Description
Reg_UID	Long Integer	Unique ID that persists.
Full_Address	String	Full address description.
Address_Number	String	Address number of building.
Address_Suffix	String	Suffix of address.
Address_Type	String	Flags whether the point is the primary building or not.

REGIONAL PLANNED LAND USE

Field Name	Type	Description
Shape	ESRI_SHAPE (Binary)	The shape field contains geometry information.
Unique_ID	Long Integer	System ID for records of this table. Each numeric value is unique.
Reg_UID	Long Integer	Unique ID that persists.
GLUC	String	Generalized future land use. This field could be populated from a look up table using either general plan land use codes or zoning codes.
Jurisdiction	String	Jurisdictional precedence.
Plan_Name	String	Special, specific or plan name.

APPENDIX D – SAMPLE MEMORANDUM OF UNDERSTANDING

PURPOSE

This Memorandum of Understanding is made and entered into by the participating agencies for the purpose of sharing and exchanging non-sensitive digital spatial information.

BENEFITS

This agreement will decrease the duplicated development of the same information, will generate standardized information, and provide for a centralized location to store and provide spatial information. The agreement also promotes the exchange of information and foster communication between agencies in Shasta County and the State of California.

DEFINITIONS

- Host Agency - The governmental agency that has agreed to physically host and manage the Shasta Regional Data repository provided under the Memorandum of Understanding.
- Metadata – information describing geospatial data, including the contact person in the data owner's agency, the contents of the database, the data accuracy, projection, datum, currency (date of data capture), and format of each data theme in the database
- Participating Agency - Those agencies, federal, state, or local that have signed this Memorandum of Understanding.
- Spatial Data - Information that contains the geographic location and characteristics of natural or constructed features and boundaries on the earth. This information may be derived from, among other things, remote sensing, mapping, and surveying technologies.
- SCRTPA – Shasta County Regional Transportation Planning Agency

DATA SHARING

1. The Participating Agencies agree to share data for mutual benefit, in order to minimize duplication of efforts and expenditures, and to enhance intergovernmental cooperation.
    a. The Participating Agencies will provide digital data in a mutually agreed format.
    b. In order to facilitate the sharing and exchange of data with participants, direct communication with other participants is authorized.
2. Use Restrictions
    a. Restrictions on the use of data provided to the host agency in addition to those set forth in this document, if any, are set forth in Appendix X attached to this MOU by the Provider.
3. Regional Data Schemas
    a. The data schemas outlined below are the framework data layers, as defined by the Shasta Regional Data Standardization Guidelines that Host Agency intends to compile for the Shasta County. This list in no way restricts what can or cannot be contributed.
        i. Street Centerlines
        ii. Parcels
        iii. Address Points
        iv. Planned Land Use
4. Regional Data Catalog
    a. The Shasta Regional Data Catalog will be maintained by the Host Agency and will be used to provide a catalog of data that are generated or produced by the participating agencies. Creation of individual agency catalogs will be encouraged for additional relatable data.

5. Regional Data Repository
    a. At a minimum, framework data will be consolidated and integrated as part of the distributed data repository.
    b. In order to keep the data at its most current level, the host agency will be allowed access to provider's datasets. Where applicable, automated procedures will be implemented to allow for systematic updates into the data repository.
6. Ownership of and Rights in Data
    a. The Host Agency acts as the steward for the spatial data in its possession. Title to, and all rights in, the data remain with the Participating Agency that contributed the data.
7. Notices
    a. Copyright. Copyright notices, if applicable, will be provided to the Host Agency by each Participating Agency in the metadata associated with the data provided by the Participating Agency.
    b. Disclaimers. Disclaimer notices, if applicable, will be provided to the Host Agency by each Participating Agency in the metadata associated with the data provided by the Participating Agency.
    c. Records. The Host Agency shall maintain a record of these copyrights and disclaimers and shall notify Licensees of this record when data is transferred to licensee.
8. Term of MOU – Provider
    a. The MOU – Provider shall be effective from the date of execution by a Participating Agency and the Host Agency. The MOU – Provider shall remain in force as long as its terms are not violated.
9. Termination of MOU – Provider
    a. Upon termination of this MOU - Provider, for any reason, the Host Agencies shall remove all files from their computer systems, return all files, documentation, and copies thereof.
10. Governing Law
    a. The MOU - Provider shall be governed by the laws of the State of California and any action related to the MOU – Provider shall be located in Shasta County, California.
11. Entire Agreement
    a. Participating Agency agrees to all statements, terms and conditions stated in this MOU - Provider. This MOU – Provider may be executed in counterparts among the Participating Agencies.

Persons who sign the MOU - Provider hereby affirm that they are authorized to encumber their organizations with the provisions herein.

Participating Agency		SCRTPA	
Organization Name:			
Date:		Date:	
Signed:	_____	Signed:	_____
Name:	_____	Name:	_____
Title	_____	Title:	_____

APPENDIX E – ROLES AND RESPONSIBILITIES

DATA PROVIDER INITIAL PROCESS

- Work with SCRTPA to identify benefits to participation.
- Decide whether to provide data; if agreed, establish the MOU between provider and regional platform
- Assist regional platform with determination of data improvements
- Declare whether those improvements can/will be maintained by the data provider
- Provide as much detail as possible for a data characteristics survey.
- Decide and inform regional GIS platform of willingness to participate in the agreement point process

And then, upon agreement, follow through to:

- Negotiate agreement points with surrounding jurisdictions
- Move segments at the boundary to meet agreement points
- Commit to maintaining those end-points
- Provide (in partnership with other jurisdiction) one set of agreement points to regional GIS platform
- Maintain agreement points and update as needed in collaboration with other jurisdictions and regional platform staff
- Submit the initial dataset to regional platform
- Where a commitment to maintain data improvements exists, review, provide feedback, and approve data enhancements performed on data in a timely manner
- Work with the regional platform staff to establish FTP-based access to the dataset
- Review, provide feedback and approve data transformation process via the regional platform loading database in a timely manner
- Make data changes identified in QA/QC that the provider decides to change within two-weeks of receipt of the report and return the changed data to regional GIS platform Project, (note: changes that can't be made within two weeks can be submitted as part of a maintenance update)

SCRPTA REGIONAL GIS PLATFORM INITIAL PROCESS:

- Explore options to improve data including adding linear referencing systems, improving addresses or other mutually beneficial improvements
- Facilitate completion of a data schema crosswalk
- Give the data provider a mechanism for providing the initial dataset
- Facilitate agreement point discussions at the point where the more than one data provider on a boundary are ready to negotiate agreement points
- Oversee enhancement of data as negotiated with the data provider
- Give the data provider the "improved" data for review and facilitate any corrections needed as a result of the review in a timely manner
- Develop transformation process and load data into regional platform loading database
- Give the data provider the transformed data for review and facilitate any corrections needed as a result of the review in a timely manner

- Run the data through change detection and re-process QA/QC
- Return change detection and QA/QC to the data providers
- Implement any changed data returned by the data provider within two-weeks
- Work with the data provider on a data understanding document
- Continue to oversee the implementation of the provider data through the rest of the regional GIS platform processes
- Establish regular communication loops with provider informing of successful dataset download, transformation and incorporation into regional GIS platform

DATA PROVIDERS MAINTENANCE PROCESS:

- Provide data to regional GIS platform based upon the maintenance schedule agreed to in the MOU
- Provide data via FTP unless other arrangements are made.
- Respond to errors generated during extract, transform and load processes
- Notify regional GIS platform staff if changes are made to the data schema or data format. These changes can cause failure of the transformation process. Significant changes may require redoing some portions of the initial process for new data providers
- Work with other jurisdictions across boundaries to maintain agreement points and related segments and based on those agreements send updated points to regional GIS platform
- Review change detection and notify regional GIS platform if there is an unanticipated level of change
- Review QA/QC and make changes deemed necessary and possible before the next maintenance cycle
- Assist the regional GIS platform in identifying and facilitating the development of the Memorandum of Understanding (MOU)
- Notify regional GIS platform when the MOU needs to be changed

REGIONAL GIS PLATFORM MAINTENANCE PROCESS:

- Support the use of the Data Provider Portal as needed
- Review and respond to transformation errors as needed
- Maintain the transformation process as needed
- Facilitate the maintenance of agreement points
- Act as the official keeper of the agreement points
- Support the return of the change detection and QA/QC to the data provider
- Answer any questions or concerns regarding the reports
- Identify parties to negotiate (see the MOU) and facilitate completion
- Facilitate maintenance of the MOUs

APPENDIX F – INITIAL REVIEW OF SOFTWARE OPTIONS

A brief discussion of each evaluated software product's capabilities is presented below.

ARCGIS SERVER

ArcGIS Server is a product of Esri, considered a leader in GIS software. An estimated seventy percent of GIS users use Esri products (http://gislounge.com/gis-software-applications/). Given this fact, it is important that a regional GIS platform be enabled for seamless integration with Esri-based data structure and output analysis. When considering the software alternatives needed for the platform, ArcGIS Server can be used as a benchmark standard for comparison – it accommodates all identified requirements, most of which are out of the box products. Because of this, ArcGIS has a distinct advantage over other software products when considering proven capabilities.

The targeted goal of this feasibility study is to recommend a Level 3 Regional GIS Platform, which requires specific applications (Decision Tree and Mobility Assessment Tool) designed to operate in the ArcGIS environment.

Some notable arguments exist against ArcGIS Server. It is not an Open Source product, although it does allow a wide range of customization using application developer framework (ADF) and application programming interfaces (APIs). There is also a relatively high startup cost, which depending upon the product level chosen, can range from $10,000 to $40,000 for initial purchase, with annual maintenance costs ranging from $3,000 to $10,000. It can be argued that this cost is offset by the out-of-the box functionality that comes with ArcGIS Server.

CARIS SPATIAL FUSION ENTERPRISE

Spatial Fusion uses two separate deployment modules: 1) a public module that is HTML based with general viewing and basic analysis capabilities, and 2) a technical module which is a desktop application including common spatial analysis functions. Customization is performed using Java application programming. The cost for the application is around $8000, based upon a single CPU on the server (plus $2000 per additional CPU), and a $1600 annual maintenance charge.

The current version of Spatial Fusion does not allow for data feedback or editing mechanisms. In addition, there is no out of the box connect for SDE data, but this is possible through third party software (using FME from SAFE Software).

GEOSERVER

GeoServer is an open source, Java-based GIS server. GeoServer conforms to the Web Feature Service (WFS) standard, permitting sharing and editing of data that is used to generate maps. WFS allows others to access data posted with GeoServer, so security and accessibility of sensitive information is a concern. While the basic software is free, additional plug-ins may be needed for full functionality. This may result in direct (third-party purchase) or indirect (in-house programming and customization) costs.

GIS CLOUD

This is a Cloud Computing-based service, which according to the provider's website provides "advanced capability of creating, editing, uploading, sharing, publishing, processing and analyzing geospatial and attribute data" (http://www.giscloud.com). Visualization is based on Adobe Flash. GIS Cloud will provide an on-demand service that appears to include most of these more advanced features. The OnDemand service would be a pay-per-use product. Currently this product is listed as a beta service, and not yet available.

GOOGLE EARTH ENTERPRISE

Google Earth Enterprise offers an enterprise-wide installation method for the situation where an entire organization wants access to Google Earth on the Internet. Per FAQ's on the product, Google Earth Enterprise isn't necessarily intended to replace an existing GIS system, but to act as "...a visualization and discovery tool....where the customer implements Google Earth Enterprise with Oracle Spatial, Esri and MapInfo systems in order to make the geospatial data readily available to more people within the organization or business." The Google Earth Enterprise solution is designed for users who have their own imagery, terrain, and/or vector data, and would like to distribute them to multiple users using a Google Earth Server.

MANIFOLD IMS

Manifold IMS is a software package built as a component of the Manifold GIS desktop software package. While this package is described as a cost effective competitor to Esri products, the IMS component does not include many of the out of the box solutions when compared to ArcGIS Server.

MAPDOTNET UX

MapDotNet is a Microsoft product with a fairly robust set of features. Originally a product to be used in conjunction with Esri's ArcIMS, this software now provides its own suite of web mapping services. The cost for a runtime license is $3,800 for the initial purchase, with $760 annual maintenance cost.

MAPGUIDE

MapGuide is an open source product originally developed by Autodesk. MapGuide does allow for most of the activities listed for a regional GIS platform, but most are not out-of-box products. The listed activities would require additional plug-ins developed for the open source platform. Autodesk sells a product called MapGuide Enterprise, which uses MapGuide and includes tools for the development and deployment of applications. The cost for Autodesk MapGuide Enterprise Professional Edition was quoted at $1895.

APPENDIX G – REVIEW OF HARDWARE OPTIONS

For comparisons, cost estimates are provided based upon the use of ArcGIS Server 10 at two license levels: Advanced Enterprise and Standard Enterprise. The Advanced Enterprise edition would be required if the MAT tool is implemented with on-the-fly analysis in the server environment, as this requires the inclusion of the Spatial extension, which is not available at the Basic or Standard Edition.

ON-SITE SERVER

In this evaluation, "On-Site Server" is defined as the computer hardware configured to house a server operating system (i.e. Windows Server or Linux) and associated software used to store and distribute information on a regional GIS platform. This hardware would reside at the determined host location.

When compared to a cloud setting, an on-site server has some advantages. On-site implies a near immediate access to the hardware when issues arise or when updates and changes are required on the hardware. Management is handled by a local source, generally providing a direct contact person when issues arise.

In terms of cost, the initial purchase price of an on-site server varies depending upon vendor and configuration. For cost comparison, Esri offers the following hardware and software packages:

Configuration	Cost
HP ProLiant DL360 with ArcGIS Server 10 *Advanced* Enterprise	$43,000
HP ProLiant DL360 with ArcGIS Server 10 *Standard* Enterprise	$26,500
HP ProLiant DL380 with Microsoft SQL Server 2008 Standard	$19,995

Using the recommended configuration of both a GIS server and a database server, the combined cost would be $62,995 (with ArcGIS Server Advanced Enterprise) and $46,495 (with ArcGIS Server Standard Enterprise). The majority of these costs come from the purchase price of ArcGIS Server 10 (Advanced Enterprise costs $40,000 and Standard Enterprise costs $20,000). Microsoft SQL Server Standard costs around $7,500. Maintenance fees for the ArcGIS Server software cost $10,000 for Advanced Enterprise and $5,000 for Standard Enterprise. Maintenance for SQL Server costs around $1,800.

CLOUD COMPUTING

Cloud Computing is defined as

> "...a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" (National Institute of Standards and Technology)."

There are various benefits and risks when considering this technology for a regional GIS platform. These include:

Benefits:

- Scalable – the number of replicated servers, server resources and storage needs can dynamically scale up or down depending on usage. This allows for rapid deployment of services for instances where demand is greatly increased.
- Potentially lower initial startup costs – server hardware and software provided and managed by third party
- Reduced maintenance and support needs
- Limited or no operational support needs from in-house IT

Risks:

- Security and privacy concerns
- Legal concerns (liability, recourse, intellectual property, vendor transparency)
- No current standards for interoperability between cloud providers
- Fluctuating costs based upon usage
- Unknown availability of technical support on-hand

Recognizing that the major players in GIS server software are currently cloud-compatible (or working towards this) proves that the industry recognizes the potential for this technology. In addition, there are a growing number of third party companies that provide GIS services via the cloud.

For cost comparisons, Esri was contacted regarding their ArcGIS Server Cloud Bundle. Costs vary depending upon the level of software and are as follows:

Configuration	Cost
ArcGIS Server Cloud Bundle (ArcGIS Server Advanced Enterprise running on a 4-core Windows Server 2008 virtual machine in the Amazon EC2 cloud infrastructure).	$40,000 per year
ArcGIS Server Standard Enterprise (per Esri, this option is not yet available, but will be available in the near future)	$30,000 first year (license and hosting), $15,000 subsequent years

Note that the configurations above do not include a Cloud-based SQL Server instance, which would be an additional cost. These costs are difficult to estimate, due to the fact that it is hard to estimate the actual demands and usage of the platform in its initial configuration. The cloud hosting by Amazon EC2 requires an hourly cost for usage, which starts around $1 per hour and goes up depending upon the services required. The Amazon EC2 Microsoft Windows Server and SQL Server package is available as an On-Demand Instance with the cost for a Large Memory, Standard Instance of $1.12 per hour (using the N. California EC2 cluster location. Based upon these hourly rates, a very rough estimate for Amazon EC2 annual costs would be $18,571 to have both services running 24 hours a day for an entire year (8,760 hours in a year, multiplied by both $1 for the Esri Amazon EC2 hourly cost, and by $1.12 for the SQL

Server service). Additional charges, such as costs for data transfer (upload), may occur, but are not included in this comparison.

A summary comparison of estimated costs for both options is detailed on the following page. To account for the additional cost of maintaining the system hardware on-site, an estimate of 10 hours per month of staffing time at $100 per hour was included in the cost comparison.

Configuration A - ArcGIS Server Standard Enterprise

Option 1: On-Site		Option 2: Cloud Computing	
ArcGIS Server Standard and HP ProLiant DL360	$26,500.00	ArcGIS Server Standard Enterprise Cloud Bundle, first year	$30,000.00
MS SQL Server Standard and HP ProLiant DL380	$19,995.00	Amazon EC2 Annual Cost	$8,760.00
		Amazon EC2 Windows Server with MS SQL Server Annual Cost	$9,811.00
Year 1 Cost	**$46,495.00**	**Year 1 Cost**	**$48,571.00**
ArcGIS Server Standard Annual Maintenance	$5,000.00	ArcGIS Server Standard Enterprise Cloud Bundle, year 2+	$15,000.00
SQL Server Standard Annual Maintenance	$1,793.00	Amazon EC2 Annual Cost	$8,760.00
Estimated Staffing Costs for Server Maintenance (10 hours per month at $100 per hour)	$12,000.00	Amazon EC2 Windows Server with MS SQL Server Annual Cost	$9,811.00
Year 2+ Cost	**$18,793.00**	**Year 2+ Cost**	**$33,571.00**

Configuration A - 5 Year Summary

	On-Site	Cloud Computing
Year 1	$46,495.00	$48,571.00
Year 2	$18,793.00	$33,571.00
Year 3	$18,793.00	$33,571.00
Year 4	$18,793.00	$33,571.00
Year 5	$18,793.00	$33,571.00
Total after 5 years	**$121,667.00**	**$182,855.00**

Configuration B - ArcGIS Server Advanced Enterprise

Option 1: On-Site		Option 2: Cloud Computing	
ArcGIS Server Advanced and HP ProLiant DL360	$43,000.00	ArcGIS Server Advanced Enterprise Cloud Bundle	$40,000.00
MS SQL Server Standard and HP ProLiant DL380	$19,995.00	Amazon EC2 Annual Cost	$8,760.00
		Amazon EC2 Windows Server with MS SQL Server Annual Cost	$9,811.00
Year 1 Cost	**$62,995.00**	**Year 1 Cost**	**$58,571.00**
ArcGIS Server Advanced Annual Maintenance	$10,000.00	ArcGIS Server Advanced Enterprise Cloud Bundle	$40,000.00
SQL Server Standard Annual Maintenance	$1,793.00	Amazon EC2 Annual Cost	$8,760.00
Estimated Staffing Costs for Server Maintenance (10 hours per month at $100 per hour)	$12,000.00	Amazon EC2 Windows Server with MS SQL Server Annual Cost	$9,811.00
Year 2+ Cost	**$23,793.00**	**Year 2+ Cost**	**$58,571.00**

Configuration B - 5 Year Summary

	On-Site	Cloud Computing
Year 1	$62,995.00	$58,571.00
Year 2	$23,793.00	$58,571.00
Year 3	$23,793.00	$58,571.00
Year 4	$23,793.00	$58,571.00
Year 5	$23,793.00	$58,571.00
Total after 5 years	**$158,167.00**	**$292,855.00**

APPENDIX H – INITIAL REVIEW OF POTENTIAL PLATFORM HOSTING LOCATIONS

CAL-ATLAS

The Cal-Atlas Geospatial Clearinghouse facilitates the coordinated and sustainable development, maintenance, licensing and sharing of geospatial data and web mapping services by California government agencies, partners and stakeholders. Cal-Atlas is managed by the California Natural Resources Agency. It is based upon the historic framework of the California Spatial Information Library (CaSIL) and data distributed by the Stephen P. Teale Data Center.

In discussions with CA Natural Resources Agency staff, Cal-Atlas could serve as a data warehouse/repository for datasets. There is also some potential for hosting a file GeoDatabase and an associated internet mapping application for general data viewing (Level 2). Anything requiring more resources (such as robust internet mapping applications or providing automated procedures for data downloading, extraction and loading) would be beyond the scope of the agency, whose primary responsibility is to the State's resource agencies and commissions to whom they report.

CITY OF REDDING

The City of Redding has an established GIS division with a long history of providing GIS datasets both for the city and the general public. The City has an existing license for ArcGIS Server (9.3.1) and SQL Server (2005 Enterprise).

The City initially expressed interest in hosting the platform, provided that additional funding would be made available to support it. This interest, combined with the City's potential capacity to house a regional GIS platform resulted in including the City of Redding in the in-depth evaluation of hosting locations.

SCRTPA

This option considers the feasibility for SCRTPA to house and manage a regional GIS platform in-house. The biggest advantage of this option would be the direct control of hardware and software resources by the agency. There are significant disadvantages to this option, primarily due to the fact that there are no dedicated GIS or IT staff on-hand within SCRTPA (this is currently provided by Shasta County staff). Thus, there would be considerable startup and maintenance costs required to manage the system. Because the majority of the GIS and IT support for SCRTPA comes from the county, there is a possibility for SCRTPA to work in conjunction with the county GIS/IT staff to develop a shared-resource for the platform.

SCRTPA was included in the in-depth evaluation of hosting locations in a shared responsibility setting with the Shasta County IT/GIS division.

SHASTA COLLEGE

Shasta College has become an important resource for providing GIS education and support in the region. As a higher educational facility, Shasta College can benefit from significant discounts on Esri software.

There is also the potential for community and educational outreach where students can be involved in the setup and management of a regional GIS platform if housed at the College.

Shasta College is interested in hosting the platform, provided that additional funding would be made available to support it. This interest, combined with the College's potential capacity to house a regional GIS platform resulted in including Shasta College in the in-depth evaluation of hosting locations.

SHASTA COUNTY

Shasta County has an existing GIS program which is managed by GIS Advisory Committee consisting of members from various County departments. The program currently has GIS software and data servers on-hand (including ArcGIS Server 9.3.1 Standard, MapGuide and SQL Server 2008 Standard) and provides services including GIS data downloads and interactive maps.

The Shasta County IT/GIS program is interested in hosting a regional GIS platform, provided that additional funding would be made available to support it. This interest, combined with the County's potential capacity to house a regional GIS platform resulted in including Shasta County in the in-depth evaluation of hosting locations (with the option of shared responsibility with SCRTPA).

THIRD PARTY - REMOTE

This option considers using a remote (non-local) Third Party for hosting and managing a regional GIS platform. There are a number of third party providers available for enterprise-level GIS database management and output product services. Examples of third party providers include:

- Latitude Geographics ArcGIS Server hosting
- 39 Degrees North ArcGIS Server hosting

Both Latitude Geographics and 39 Degrees North provide ArcGIS Server hosting, but only for the Standard Edition of ArcGIS Server. Costs for these hosting services vary depending upon the number of map services provided, storage requirements, and volume of use. Latitude Geographics' hosting is based on the use of their Geocortex Internet Mapping application, which is a customized suite of products based on the ArcGIS Server platform. This service costs an average of $700 per month, with startup costs ranging around $3,000 to $5,000. 39 Degrees North hosting is based on the number of Map Services hosted, and uses the ArcGIS Server Standard Edition. Costs for this were estimated at $500 per month for two Map Services, with a $175 per month per additional Map Service. Startup costs were estimated at $1,625.

Because of the custom applications required by a regional GIS platform and the need for flexibility in the number and type of outputs provided, the Third Party – Remote host is not a viable option.

THIRD PARTY - LOCAL

Another Third Party hosting consideration would be utilizing a local, private GIS firm with existing expertise in GIS hosting. For this consideration, VESTRA Resources Inc. was included in the data hosting matrix. VESTRA has developed several dozen departmental and enterprise GIS systems for clients, some for very small organizations with limited budgets. As such, VESTRA is well-versed in implementing

ArcGIS Server systems and has knowledgeable staff on-hand for efficient management, custom application development, and data development and modeling.

VESTRA is interested in hosting a regional GIS platform, provided that contract funding would be made available to support it. This interest, combined with the VESTRA's potential capacity to house a regional GIS platform resulted in including it in the in-depth evaluation of hosting locations.

APPENDIX I – POTENTIAL HOST SURVEY

As part of the development of the feasibility study, VESTRA Resources Inc. is evaluating potential host locations to house and manage the GIS platform. The following survey is a review of your organization's capacity and willingness to act as a host.

HARDWARE AND SOFTWARE MINIMUM REQUIREMENTS

Based upon the anticipated configuration of the GIS platform, the minimum requirements are:

(1) GIS Server
   a. Hardware:
      i. One Quad Core 3GHz Processor
      ii. 12 GB RAM
      iii. Two Mirrored 146GB 15000 rpm hard drives
   b. Software
      iv. Microsoft Windows Server 2003 or 2008
      v. ESRI's ArcGIS Server 10, Advanced Enterprise Edition (including GeoStatistical, Spatial, and Network Extensions)

(2) Database Server
   c. Hardware
      vi. One Quad Core 3GHz Processor
      vii. 12 GB RAM
      viii. 1 TB RAID Storage
   d. Software
      ix. Microsoft Windows Server 2003 or 2008
      x. Microsoft SQL Server 2008

(3) Bandwidth
   e. Availability of a dedicated T1 line (or comparable bandwidth) to accommodate 25-50 users at any given time.

It is anticipated that the initial version of the GIS platform will function as a data warehouse, allow web-based viewing, querying and analysis, and provide multiple levels of access, ranging from free public access to restricted-use by select agencies or organizations.

Please provide an evaluation of the following components in terms of your organization's resources and capabilities. If you have any questions, please contact Clint Kellar with VESTRA Resources Inc. at 223-2585 or ckellar@vestra.com

Agency / Organization:	
Name:	
Title:	
Phone:	
Email:	

	YES	Possible with Funding	No
Is your organization interested in hosting the Regional GIS Platform?			
Is it likely that your organization will have additional revenue or grant funding to assist with the startup and maintenance of the GIS platform?			
Do you currently have any ArcGIS public facing web services?			
Do you have IT staff on-hand available for setup and management of the GIS platform (hardware and Windows Server)?			
Do you have a GIS Server Administrator available on-hand for setup and management of GIS Platform software (ArcGIS Server, SQL Server 2008)?			
For IT and GIS staff on-hand: ▪ Is there demonstrated ability and depth to maintain the GIS platform with "cutting edge" technology? ▪ Is the management and staff interested in assuming the responsibilities that come with the GIS platform?			
Do you have a server capable of functioning as the GIS Server based upon the described minimum system requirements?			
Do you have a license for ArcGIS Server with current maintenance? If YES, please list the version and edition:_____ Do you intend to upgrade to version 10?			

When?_____			
Do you have a server capable of functioning as the Database Server based upon the described minimum system requirements?			
Do you have a license for SQL Server? If YES, please list the version and edition: _____			
If an existing server(s) is not available, is there physical space available to house additional hardware (i.e. space available within an existing server rack?			
	YES	**Possible with Funding**	**NO**
Does the server room have dedicated cooling system for maintaining a consistent room temperature?			
Does the facility have an Uninterruptible Power Supply that would be available for the GIS and Database Servers?			
Is there controlled access to the server room (locked room with limited access)?			
Are there backup and recovery systems in-place for existing server hardware?			
Describe the backup and recovery system:			
What is the current incoming and outgoing bandwidth at the facility?	Incoming:_____ Outgoing:_____		
What is the current bandwidth utilization at the facility?			

COST ESTIMATES

Please estimate the following costs associated with your organization housing and managing the GIS platform. If a resource is available without any additional cost, indicate with "No Cost"

Startup Costs		**Comments/Notes**
Staffing costs for setting up a Windows 2008 Server, ArcGIS Server 10 and SQL Server 2008.	$	
Additional funding necessary for hardware/software upgrades to meet the stated requirements (e.g. hard drive upgrades, UPC or backup system upgrades, SQL Server upgrade to 2008, etc).	$	
Ongoing Costs		**Comments/Notes**
Annual staffing costs required for management of the GIS platform (both IT and GIS)	$	
Annual hardware maintenance costs	$	
Annual software maintenance costs	$	
Annual infrastructure costs (e.g. bandwidth/internet access)	$	

APPENDIX J – EMAIL FROM LATITUDE GEOGRAPHICS REGARDING FLEX VERSUS SILVERLIGHT:

From: Drew Millen [mailto:dmillen@latitudegeo.com]
Sent: Monday, August 09, 2010 11:19 AM
To: Geocortex Support
Subject: Geocortex Viewer Direction Q&A
Hello,

Last week Latitude Geographics announced the 2.0 release of our Geocortex Sample Flex Viewer. Following this announcement we received a number of excellent questions regarding the Geocortex Sample Flex Viewer as well as the product direction of Geocortex Essentials. We think it makes sense to distribute responses to these questions, which appear below.

I'd like to remind you that our CEO hosts a monthly "Geocortex Solutions for ArcGIS Server: Current Status and Road Ahead" webinar, which is a great way to stay informed about our latest development and upcoming technology direction on an ongoing basis. You can register here: http://www.geocortex.com/learn/index.html.

Question 1

I understand the desire to move toward Flex, but one of our concerns at the City is that we intend to use the Geocortex browser as a way for the public to view our GIS data. Currently to view Flex through Internet Explorer requires a plug-in. We don't believe many of our citizens will understand the need or are able to easily complete that requirement.

Do you have any idea as to how we can avoid requiring that plug-in for our citizens?

Answer:

We also dislike plugins, and consider them a hurdle in front of the map counter. Fortunately, the Flex viewer only requires Adobe's Flash plugin which is extremely pervasive (on about 99% of computers!: http://www.adobe.com/products/player_census/flashplayer/version_penetration.html). In fact, we believe this is the number one reason why organizations that choose Flex over Silverlight do so; concerns about requiring the less ubiquitous Silverlight plugin from Microsoft (as of March 2010, it was on about 60% of computers) typically leads to Flex/Flash. As a Microsoft offering, Silverlight will continue to quickly gain market share, but presently market share definitely is a consideration. The purest way to go is to build on the JavaScript API (for which we offer a powerful API, but not a viewer) because it requires no plugin whatsoever, but we think there are other tradeoffs that seem to be leading most organizations to Flex or Silverlight. At Latitude, we've generally found JavaScript API development more of a hassle (e.g. ensuring cross-browser compatibility, lack of advanced integrated development environment).

Question 2

Is the Silverlight version available yet? If not, when?

Answer:

The Geocortex Viewer for Silverlight is not yet available, but we're fast-tracking development based on information gathered during at the recent Esri International User Conference. Our assessment is that people who have gone Flex have often gone so not because they prefer it as a platform, but because it seems like the safest choice with the most momentum. Our assessment is that Silverlight is what most organizations prefer (assuming its market penetration continues to grow, and we have no reason to believe otherwise) because it is a superior platform for development and integration. I can't give an exact date for its release but the Geocortex Viewer for Silverlight is our #1 development priority. Don't be surprised if it arrives before the final productized Geocortex Viewer for Flex towards the end of the year!

Question 3

Throughout the development process of your upcoming Flex and Silverlight viewers, which technology have the developers preferred working with and which has been the fastest/easiest to develop with? (I'm assuming Flex, given your stopgap viewer but I was once told never to assume anything).

Answer:

That was wise advice you received regarding assumptions. ;) This is an easy one. Hands-down, our team prefers Silverlight API development (followed by the Flex API, following by the JavaScript API). Part of this is likely related to familiarity of our team with the Microsoft platform, but they insist that's of limited importance. Instead, they consider Silverlight a proper structured development/programming platform, whereas Flex isn't. Like PHP, Flex is easier to get rolling with, but my team doesn't consider it professional grade in the way Silverlight is. If an organization is using .NET and other Microsoft technology already, they consider Silverlight the obvious choice from a developer's perspective. Even the experienced Flex/Flash expert we hired switched camps once he got a taste of working with Silverlight!

We theorize that once Silverlight market penetration crosses 90% (likely sometime next year), Silverlight will slingshot ahead of Flex. Silverlight-based work already scheduled should result in Silverlight viewer capabilities substantially exceeding those of Flex by mid-2010.

Don't worry about this too much unless you plan to do considerable custom Flex development; a key goal for us is to make any transitions from Flex viewers to Silverlight viewers as straightforward as possible for our clients.

Question 4

(Our organization) is heavily reliant on your essential framework product line...which we understand is Esri ADF based. Our implementation is fully xml based using your manager (we have little .net customization) as we have paid for Geocortex to customize the essential core framework product line to best meet our mapping needs.

We like the consistency that framework enforces within (our organization) – however we have team members that are also attracted to features in your new products.

Does Geocortex's migration/integration pathway for essential framework allow users to take advantage of features being offered in your newer products?

Answer:

Every Geocortex Essentials licensee receives our Web ADF Elements and REST Elements as part of their standard license.

Our framework-centric philosophy remains unchanged. Right now, site structures are configured through our excellent new Geocortex Essentials Manager for REST Elements. Even viewer level configuration will soon be available via our Geocortex Template Engine (simultaneously, a goal is to render the specific technologies associated with basic viewers interchangeable).

Although Esri has announced the deprecation of Web ADF following 10.1, we expect it will take time for similar functionality to be available through REST. For this and other reasons, we expect many clients that leverage our Web ADF Elements will continue running their production apps much longer than third-parties might expect. At the same time, we encourage folks to take advantage of the benefits of the new technology and the advantages it provides (in terms of user experience and alignment with the future) when they can. Longer term, and with several hundred licensees using our Web ADF Elements, it is clear that developing utilities to make migration smoother will prove popular.

Best regards,

Drew Millen
Latitude Geographics Group Ltd.
dmillen@latitudegeo.com www.latitudegeo.com
Head Office: 200-1117 Wharf Street, Victoria, BC Canada V8W 1T7
Tel: (250) 381-8130 Fax: (250) 381-8132

APPENDIX K – FROM GISI'S BLOG

(http://blog.gisinc.com/2009/12/01/which-arcgis-server-api-or-adf-should-i-choose/)

Which ArcGIS Server API or ADF Should I Choose?

By Michael Healander

One of the most common questions I receive from clients lately is: "Which API should I use?" Unfortunately it is not a simple answer; Esri provides three APIs and two ADFs which include; JavaScript API, Flex API, Silverlight API and the .Net and Java Web.ADFs. I answer the question with a combination of questions needed to isolate the answer. For example:

What version of ArcGIS server are you running?

The ArcGIS APIs are only supported at the 9.3 version. Any version bellow ArcGIS Server 9.3 would require the Web.ADF.

Is browser plug-ins an option?

ArcGIS Server APIs for Flex and Silverlight require browser plug-ins. If your application cannot require a plug-in, the JavaScript API or one of the Web. ADFs will need to be your choice.

The ArcGIS Server API for Flex requires the Flash plug-in, which 99% of Internet clients seem to have. The Silverlight plug-in has not yet reached the same level of ubiquity, but can be expected to gain ground. Plug-ins come in different versions, which may also present a hurdle in getting end users to experience the Web site in the way you expect. If you choose to use Flex or Silverlight, it is wise to consider how flexible you are to upgrade plug-in versions. The ArcGIS API for Flex requires Flash Player 9 or above. The 1.0 release of the ArcGIS API for Silverlight requires Silverlight 2 or above.

How quick do you want to get it done?

Web.ADF out-of-the-box is the fastest way to deploy, followed by Flex, JavaScript, and then Silverlight. To get a client jumpstarted they have the following options; the sample Flex viewer template can be downloaded and configured using an xml file. JavaScript can be added to an html page and edited using note pad. Silverlight requires Visual Studio and Expression Blend and the sample template has some quality issues.

Which platform are your developers most comfortable with?

Many beginning developers find the JavaScript and Flex easier to learn than the Web.ADF or Silverlight, but Silverlight and ADF have the power of the .NET framework behind it. I suggest choosing a platform that your staff already knows and can save you ramp-up costs. However, we are seeing a lot of community based support for the Flex API, lots of contributed samples and code snippets. We expect to see the same sort of community support for the Silverlight API as well. Additionally, the .NET ADF can become fairly heavy if a lot of customized functionality is needed. This can impact performance.

What Integrated Development Environment (IDE) is needed?

When you choose an API, you are also making choices about the environment where you'll spend your time coding. Flex developers use Adobe Flex Builder 3. .Net and Silverlight developers use Visual Studio or Visual Web Developer Express. Expression Blend is another option for Silverlight developers. Java developers use Eclipse or NetBeans. JavaScript programmers probably have the most choices, including the option to just write code in a text editor. Cost of the IDE may also a factor.

Do you need to edit features over the Web?

GISi already has a limited editing framework for the APIs. The .Net and Java ADFs offer access to fine-grained ArcObjects, which can be used to edit feature geometries. The ADFs contain out-of-the-box tasks for basic Web editing operations. If you need to build an application with Web editing fast and now, go with the ADF. More editing features are planned for the JavaScript, Flex, and Silverlight APIs at the release of ArcGIS Server 9.4 in 2010.

What is the industry trend?

I'm definitely seeing a trend away from the ADFs and towards the APIs. Out of the APIs it's a close race. Flex has come out of the gates fast and has a bit of a lead on the others, but Silverlight has Microsoft behind it and Esri is definitely working close to Microsoft.

After answering questions like these, the clients usually have a clear answer. Several of my answers might be subjective, so I try to keep my personal perspective or opinion and desires out of the equation, unless asked directly.

XXX XX, 2010

PURCHASE ORDER

TO: ENPLAN
3179 Bechelli Lane, Suite 100
Redding, CA 96002

FROM: Dan Wayne, Senior Transportation Planner

BILLING CODE: XXXXXX

CMAS CONTRACT #: 3-10-70-1253C

SERVICE PERIOD: 10/25/2010 – 06/27/2011

MONTHLY COST: $14,474.08

Labor Category	Service	Rate	Hours	Total
Programmer Marc Pfister	IT – Database Design	$101.60	177	$17,983.20
Senior Analyst Todd Burciaga	IT – GPS/GIS	$80.20	469	$37,613.80
Analyst Benita Moore	IT – GPS/GIS	$66.30	644	$42,697.20
Analyst John Luper	IT – GPS/GIS	$66.30	305	$20,221.50
Project Administration Matt Nichols	IT – GPS/GIS	$85.50	58	$4,959.00
Project Principal Randall Hauser	IT – GPS/GIS	$219.10	31	$6,792.10

INVOICE TO: Shasta County RTPA
1855 Placer Street
Redding, CA 96001

Subtotal:	$130,266.80
Sales Tax:	$0.00
Shipping & Handling:	$0.00
Total:	$130,266.80

AUTHORIZATION:

_____
For the Shasta RTPA

XXX XX, 2010

PURCHASE ORDER

TO: ENPLAN
3179 Bechelli Lane, Suite 100
Redding, CA 96002

FROM: Daniel Wayne, Senior Transportation Planner

BILLING CODE: XXXXXX

CMAS CONTRACT #: 3-10-70-1253C

SERVICE PERIOD: 10/25/2010 – 08/29/2011

MONTHLY COST: $17,749.02

Labor Category	Service	Rate	Hours	Total
Programmer Marc Pfister	IT – Database Design	$101.60	221.5	$22,493.67
Senior Analyst Todd Burciaga	IT – GPS/GIS	$80.20	697	$55,896.71
Analyst Benita Moore	IT – GPS/GIS	$66.30	996.5	$66,070.39
Analyst John Luper	IT – GPS/GIS	$66.30	301.5	$19,978.63
Project Administration Matt Nichols	IT – GPS/GIS	$85.50	72	$6,160.87
Project Principal Randall Hauser	IT – GPS/GIS	$219.10	31.5	$6,889.95

INVOICE TO: Shasta County RTPA
1855 Placer Street
Redding, CA 96001

Subtotal:	$177,490.22
Sales Tax:	$0.00
Shipping & Handling:	$0.00
Total:	$177,490.22

AUTHORIZATION:

_____
For the Shasta County RTPA

Shasta County
Regional Transportation
Planning Agency

1855 Placer Street • Redding, CA 96001 • (530)225-5661 • FAX (530)225-5667
E-Mail scrtpa@co.shasta.ca.us • HOME PAGE www.scrtpa.org

Daniel S. Little, Executive Director

October 18, 2010

Charlie Haase, Chief Technology Officer
Shasta County Information Technology Department
1450 Court St., Suite #124
Redding, CA 96001-1656

Dear Mr. Haase,

The Shasta County RTPA is endeavoring to generate a region wide, multi-jurisdictional database of GIS spatial and attribute data. The initial project area will include the three cities and portions of the county within the south-central urban region (SCUR).

The Shasta County RTPA has obtained partial funding and would be interested in partnering with the county to deliver spatially accurate GIS data for the entire county, including attribute data typically assigned to each parcel. It is anticipated that such a partnership would involve multiple county departments with a direct need for GIS data, including but not limited to the Assessor's Office, Resource Management, and the Sheriff's Department.

If interested, please contact me to discuss the county's needs, coordinate a joint effort, and to determine an appropriate cost-sharing plan.

Sincerely,

Daniel S. Little, AICP
Executive Director