CITY OF SIMI VALLEY

THE CITY OF SIMI VALLEY, CALIFORNIA

GIS ASSESSMENT AND REVITALIZATION PLAN

Phase II: Revitalization and Action Plan

JANUARY 2018

GEOGRAPHIC TECHNOLOGIES GROUP®

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UNDERSTANDING LOCAL GOVERNMENT

CITY OF SIMI VALLEY

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DEFINITIONS AND CONCEPTS

Geographic Information Systems (GIS) technology provides a framework for organization-wide cooperation by using location as a common frame of reference, allowing individuals and departments to share information about locations. An enterprise GIS promotes interoperable technologies, standards, and methods, thus facilitating a more efficient and effective use of the technology. Coordinating efforts helps organizations better use the analytical capabilities of GIS technology and results in less staff time spent searching for, compiling, and integrating GIS data.

GIS Technology Principles

GIS is unique within information technology because of the relatively high start-up costs, data integration expenses, and longer pay-back periods. Therefore, the challenges associated with governing a GIS are unique and require governance principles and rules, in addition to the information technology principles and specific local government principles. For a government to maximize the return on investment while improving business productivity, GIS best practices and principles need to be recognized in the following ways:

GIS information is highly valuable and as such it must be integrated with technology initiatives.

The goal is to develop the data once and to re-use it multiple times and for many different purposes. By pooling resources and reducing expenses, sharing the base information lowers the overall start-up and maintenance costs. The organization becomes more productive because working collaboratively is less expensive than working as individual business units. In contrast, it is particularly expensive if each business unit or business system attempts to develop GIS information independently.

There is a longer payback and return on investment because it takes multiple years to implement a GIS. Extensive data acquisition efforts are required to build a GIS. Initial data gathering is typically conducted using aerial photography known as "a fly-over". The government issues a Request for Proposals (RFP) and contracts with an aerial photography company to fly the area and capture photographic images that are then geo-referenced to known ground control points. The data is processed and used to digitize the land base features. The fly-over process and data creation process can last from 1 to 3 years depending on the area's geographic size and the technology deployed. Parcel and tax map layers require an additional 1 to 3 years of field work, deed research and boundary compilation. Networks for water, sewer, and storm water could require additional physical surveys and extensive site and construction plan research. These surveys can take an additional 1 to 3 years. Each listed process could cost several million dollars, in addition to the cost of specialized GIS software. As a result, the government may invest heavily in a GIS implementation even before the first map is produced. The longer timeframe for return on investment (ROI) can make it difficult to maintain momentum and encourage participation during implementation efforts.

Special software and modules are required for GIS integration. The need for specialized software that bridges the gap between file databases and dynamic geospatial information results in higher integration costs for GIS. For example, the software allows Engineers to visualize which water network segments are at risk for breakage by overlaying the water distribution network layer with a layer that depicts increases in water usage. To perform this analysis, the GIS needs to communicate with the water billing system. GIS software bridges the

communication gap, but it has a higher cost of ownership than a billing system alone. The return on this investment results from preventing a water main break, wasted release of treated drinking water, customers being out of service, and avoiding the risk of flood damage to adjoining property.

GIS information is critical to the enterprise, and as such, it is universal and complete and enables the public decision making process.

GIS is often used to enable strategic decision and policy making and in providing information for regulatory compliance. GIS supports engineering modeling functions, planning, analysis and operations. GIS is used to dispatch emergency services and to enhance public safety. Each outcome is very important to the organization's mission and greatly enhances service. GIS enables an organization to save time, money and lives. To support these outcomes, GIS must be easy to integrate with existing and future information systems and made available to the entire enterprise. Regardless of ownership, GIS operational functions must be aligned with appropriate resources and implemented by professional and dedicated GIS staff. Timely, high-quality GIS information is necessary to support desired GIS outcomes.

GIS information is largely public information (information that can be collected from the public right-of-way or from the public airways). This information is used for determining public policy, and appropriate information should be openly accessible and used to facilitate public knowledge and meet public expectations for service.

Public information and its spatial components should be made available to citizens to increase awareness about the government decision making process. GIS can identify potential hazards, indicate where services are located, and promote economic vitality opportunities. GIS information supports economic development and tourism opportunities by providing location data in relationship to desired amenities. Demographic analysis enables businesses to relocate or to target advertising to a particular market. Information about the locations of public transit, parks, and municipal buildings are important to the public, particularly for newer residents and visitors. Mapping health hazards, flood zones, evacuation zones, zoning, and public easements are very valuable, especially when selecting properties for homes, sites for buildings or emergency shelters. GIS analysis and maps are often used to support decision making and to develop policy. Providing repeatable analysis and information helps citizens understand the decision making process and enables them to provide informed input. The public has the right to inspect public records. Citizens should have open access to examine how their real estate properties are being assessed in comparison to similar properties in the jurisdiction. Open inspection of records can detect clerical or process errors quickly. They should be informed

of new construction projects and re-zonings or zoning variances to help maintain a quality physical environment. Access should be provided universally in a format that promotes accessibility with little to moderate costs. Dissemination strategies should balance the public's right to know with the public's right to privacy. GIS applications should meet the same standards and expectations as other public-access applications. They should be fast, attractive and easy to use. GIS applications should be an integral part of government services and information provided via the Internet, enabling citizens to gather information from work or at home and to minimize the need to visit government offices or call 311.

GIS Initiatives are aligned with business processes and functions.

A well designed GIS product universally enables the business process. GIS applications, like other information technologies, are implemented to improve organizational productivity. The ultimate GIS is a system that is universal and seamless. People with little or no experience can utilize the technology without training. The technology itself is transparent to the end-user. GIS improves productivity because it enables people to locate resources, assets, and features that otherwise are hidden deep within the complex layers of corporate databases. GIS information must be available and current so that it can be used within the business process to support business decisions.

GIS provides the core functionality and basic map interfaces needed to locate and identify global positions. GIS data can be integrated with any database, regardless of format, as long as a common link such, as address or property number, exists in both systems. Once the link is established, users can easily join database tables to generate extended information about locations. GIS spatial analysis tools and the ability to visualize information on maps enable the end-user to identify spatial relationships that are otherwise obscured by overwhelming amounts of tabular data. However, in order to support spatial analysis, data integrity rules are required to ensure that the linkages between databases are maintained. Metadata ("data about data") is very important to GIS because it documents database properties and lets the end-user know what information is available for analysis. It should contain documentation of the workflows and procedures used to create data. In addition to providing users with valuable information, end-users can review the metadata to help maintain data integrity and to prevent programming errors, bugs, and flawed logic. Metadata also enables developers to focus on solutions that improve business processes so they can develop appropriate solutions that meet business needs. A good system development life cycle starts with understanding end-user needs and then soliciting their input throughout the entire planning and implementation period. Consent agreements with GIS end-users reduce costs and improve data sharing at a universal level. GIS is not an island unto itself but,

rather, a bridge that spans the gap between traditional information processing and real world spatial business process need.

A **GIS Governance Model** is an organizational structure and process that facilitates GIS technology growth and use. Governance model implementation can be complex and problematic, but the right governance model is critical for effective technology diffusion. If the aim of implementing geo-spatial technologies is to improve organizational effectiveness and efficiency, then selecting a governance strategy is a critical key to success. The appropriate governance model is even more important when considering multi-departmental/shared GIS resources.

Collective organization experiences prove that achieving an operational GIS application does not guarantee its use. Implementation is largely a social and political process which has to be nurtured and cajoled rather than imposed and controlled. The selection, therefore, and implementation of the right governance model (one that follows the GIS implementation principles) could give rise to positive and beneficial characteristics. Alternatively, the selection and/or implementation of a poorly suited governance model (one that does not follow the implementation principles) can have negative consequences. The following table contrasts the results of good GIS governance against that of misguided GIS governance.

GOOD GIS GOVERNANCE RESULTS:	MISGUIDED OR LACK OF GIS GOVERNANCE RESULTS:
• Supports effective strategic decision making • Organization-wide resource planning • Seeing GIS information as a public resource • Project and process management • Prioritized resource control • Clear lines of roles, responsibility and accountability • Easy geographic information exchange • Timely response to internal and citizen GIS requests and questions • End-user participation • Stakeholder consent building • Increased productivity • Accurate information, map data, and statistical reports • Working as a team	• Assumption based decision making • Empire building • Misinformed public • Data and process duplication • Variations in priorities • Constant internal competition over funding projects and resources • Information hoarding or missing information • Inability to locate critical or timely information • Insensitivity to users' needs • Insufficient prevention and response • Inefficient decision making • Poor training and education • Poorly maintained, misplaced and stale information • Everyone going their own way

History of GIS Governance at the City of Simi Valley

As Simi Valley's GIS technology has evolved, it has historically shifted between multiple, but informal, governance strategies and within various departments. Initially (early 1990s), GIS in Simi Valley was being utilized in pockets on an as needed basis and was largely project based (i.e. purchased for use for a specific project). In the early 1990s the first GIS Position at the City was created – Senior GIS Analyst. This position was placed in Information Systems (IS). Soon thereafter, an RFP was released for the establishment of a GIS and a permitting system. The City selected a team of vendors to include, Fugro (project manager), Psomas (co-manager) and Geonex. Some of the deliverables included, the conversion of mylar maps for the sewer system, conversion of hand-drawn maps of the water system, and the acquisition of an AutoCAD based parcel layer from the County. The separate AutoCAD parcel files were then pieced together as an Esri layer. All of the files were established as ArcInfo GIS layers on Hewlett Packard Unix workstations.

The one GIS person in IS focused on data building for the next few years. In 1999, a second Senior GIS Analyst was hired in IS (totaling two on staff). The original Senior GIS Analyst began to focus on more IS related tasks and less on GIS at that time. Additionally, the second Senior GIS Analyst was tasked with oversight of the permitting system and help desk. In the early2000s one of the Senior GIS Analyst positions was open, and eventually the position was devoted to other IS responsibilities. In 2001, the Senior GIS Analyst was re-titled to GIS Coordinator. A GIS Analyst position was created in 2003, but after going through a recruitment that did not result in a hire, the position was reallocated to IS services in the Police building. In 2006, the GIS staff was again expanded with an additional staff person that focused on supporting the permitting system. However, the person that filled that position retired in 2010 and that position was repurposed to another IS position. Throughout the life of GIS, interns were hired to assist with various projects (land use layer creation and address verification). In 2014, the City opted to move the one permanent GIS position to Public Works and continued as the GIS Coordinator for the City. Public Works is the largest user of GIS and their need for expanded GIS drove this move. Water and Sanitation enterprise funds have historically provided the implementation and operational costs of GIS. The Public Works Director has allowed the GIS Coordinator to serve other departments and assist with their GIS needs based upon the portion of GIS funding derived from the City's General Fund.

The GIS Coordinator has been given autonomy to serve all departments. However, there is a large volume of GIS needs within Public Works and a large amount of his time is dedicated to satisfying these needs. Over time GIS use has grown within departments, necessitating more advanced users in some heavy GIS using departments. These "power users" have varying levels of skills and include:

- One Crime Analyst in Police
- Emergency Services Manager
- Two Planners in Environmental Services
- Management Analyst in Community Services
- Public Works
    - Two Senior Engineering Technicians
    - Two Assistant Engineers
    - Environmental Compliance Coordinator

Staff throughout the organization relies on the GIS Coordinator in Public Works for GIS support. One issue facing many organizations and the City of Simi Valley is the natural inclination to use GIS staff (GIS Coordinator) for other information technology projects. It is important that the GIS Coordinator and future GIS staff are not tasked with supporting IS systems, such as Hansen or the new EnerGov implementation other than the provisioning of needed GIS services and data.

From the management perspective, GIS was loosely guided by a GIS Executive Steering Committee from 1999-2007. However, over time the Steering Committee became less of a focus until it was disbanded. Today, quarterly meetings between the GIS Coordinator and the Director of Public Works is undertaken to assist with establishing project priorities for the year. Also, a GIS User's Group was active from 1999 – 2007.

Some departments, such as Public Safety, operate somewhat independently as their public safety software has specific tools and formats for managing data. City leadership recognizes the enterprise-wide value of GIS and as such realized the need to elevate GIS within the organization. GIS is now recognized as a corporate-wide program and actions are being taken to advance GIS throughout the organization (including this plan).

Newer GIS technologies including GIS web applications, back-office databases, and open architectures have allowed the GIS technology pendulum to swing back towards a more enterprise model. GIS information can be more easily integrated with other information systems. The City realized that a central GIS resource (GIS Coordinator) is indispensable to support the GIS users. However, no mandate has been adopted that tasks a staff person with ensuring that GIS is advancing and excelling at an enterprise-wide level. The GIS Coordinator is a member of the Public Works Department focusing first on the needs of that department and then assisting other departments as they have time. Heavy GIS using departments (Police, Environmental Services, and Community Services) have developed GIS skills out of necessity.

In some ways the GIS Coordinator is in an untenable position. He has the title of GIS Coordinator but is housed in a heavy GIS using department. Therefore, he is tasked with doing Public Works GIS tasks for a bulk of his time. However, his title of GIS Coordinator typically indicates a person who is independent of any one department and whose time is divided with helping advance GIS in all departments and setting enterprise-wide standards and processes. Because the GIS Coordinator does not have an enterprise-wide mandate, GIS is more reactionary without a clear vision of priorities and long-term goals.

GIS is not a traditional technology. With a traditional technology, hardware and software are acquired and installed, end-users are given training, and then IS ensures that the hardware and software maintain their operability. GIS is a multi-faceted program made up of many technologies. GIS should become the window into all of the other applications in which the City has invested. At an enterprise-wide level, GIS becomes the conduit for centralized information and decision making. It effects how each department does their job. It alters many long-standing processes. A program that is this far reaching requires a well-defined and officially adopted governance strategy. If it is seen as just another technology, then it will fail to achieve the desired results.

The ultimate success of an enterprise-wide GIS will depend on the ability to govern and manage GIS in this evolving and complex multi-departmental environment. There are two primary organizational structures or governance models used to implement GIS in organizations. A third structure can be argued but is essentially a combination of the two primary models.

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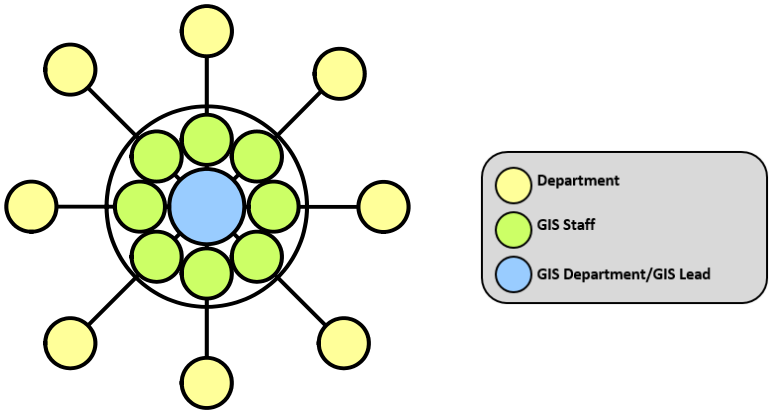
ENTERPRISE-WIDE **ORGANIZATIONAL MODELS**

There are two primary organizational structures used to implement enterprise-wide GIS within organizations throughout North America. The first type is a **centralized** structure. A centralized organizational structure maintains a central department or division that is responsible for all GIS services. In this type of structure, GIS often has its own dedicated department or is a division of an Information Services (IS), Technology Services, or GIS using department. The GIS department/division employs a cadre of management, analysts, technicians, and programmers tasked with hardware, software, application development, planning, and training. Data are created and maintained by this group, or outsourced to contractors. All other participants are characterized as end-users, with primarily the capability to view, query, and analyze spatial data. However, with the advent of a new set of easy-to-use data collection tools and applications, end-users in some cases will be contributing to data creation and data maintenance.

Business units use the data for day-to-day operations or detailed analysis. Feedback is channeled through the chain-of-command to the lead GIS staff person/s. In some cases, oversight comes from a steering committee and end-user groups. Bureaucracy and duplication of effort are minimized since there is a central command and control and a single budget source. GIS functions are split into teams that are responsible for each function and requests for services.



Centralized GIS Organizational Structure

This model can be compared to the military model or the water works model. The end-user of the service relies on the central GIS business unit to provide clean GIS information. The end-user just has to turn on the faucet and out flows the GIS information. The end user does not need to be aware of the effort or processes that produce the information; similarly, a person at the end of the water faucet does not have to worry about the infrastructure and management process required to provide clean drinking water. The centralized model is very efficient, and as such, is typically utilized by single departments, large government agencies, the military, and business corporations.

When a well-planned centralized GIS organizational structure is implemented, the government can expect:

- Clearly defined roles from a central chain and command
- Standard software and maintenance procedures
- Shared overhead costs
- Decisive and straight forward direction
- Solutions to operational problems that are implemented from the top down
- Greater operational efficiency for staff throughout the organization
- Reduction in data duplication
- Many integration opportunities with other business systems
- Central access point for data sharing
- Team based processes in which critical functions are beyond one person deep
- Increased support for business areas through a pool of team based resources
- Mitigation of GIS service disruption from staff turn-over through a pool of team based resources

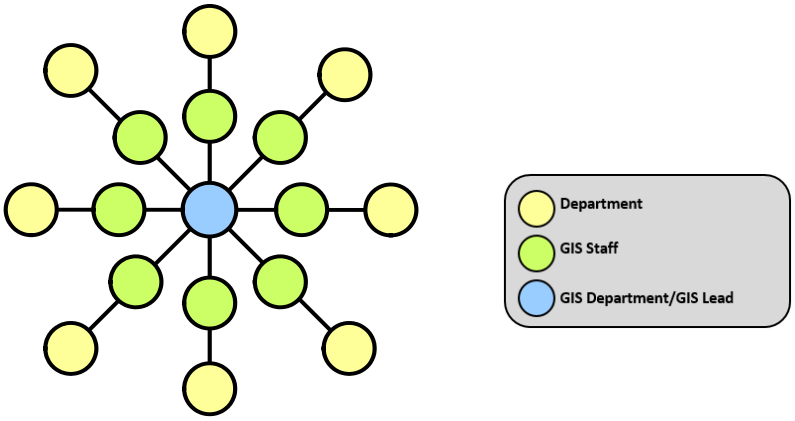
- Spatial information maintenance that improves because users are well trained and devoted to specialized tasks.

If the Centralized model is applied, then the governance authority must be aware of and avoid issues such as:

- Inflexible decision making
- Maintenance procedures and standards becoming too rigid
- Poorly funded implementations or budget cuts disrupting the whole system (all the eggs are in one basket)
- Lack of end-user input and design in the planning process
- Smaller agency may not know what to ask for from the central agency since they don't have any GIS experience
- Poor centralized leadership or direction, with the top down design, could lead to undesired results.

The major strength of the centralized model is a well-structured and defined universal GIS system that is highly efficient and effective for the entire enterprise. The weakness of this model is that it can become too rigid or inflexible for stakeholders. If this model is used, Simi Valley would benefit from a well-run efficient machine with few redundant processes, but the City must be careful not to isolate stakeholders. Many cities usually shy away from the centralized model, since it has a comparatively higher start-up cost than the other models.

The second type of model for GIS governance is a **decentralized** structure. A decentralized organizational structure divides GIS responsibilities throughout various departments. Decentralized organizational structures may still have a GIS section/division, operating independently or under the jurisdiction of another department. This approach divides system and data maintenance between the GIS section/division and departmental end-users. During their course of daily business, users update an enterprise database (e.g., using ArcEditor to edit data). All users share responsibility for maintaining the GIS, and users within each department maintain specific data according to their thematic disciplines and specialties. This type of organizational structure enables the GIS section/division to focus on hardware and software maintenance, data exchange and distribution, application/data design and development, user training and support, community extension, and technology innovation, instead of devoting time to the creation and maintenance of data.



Decentralized GIS Organizational Structure

When a Decentralized GIS organizational structure is implemented properly, benefits include:

- Ability for departments to guide GIS activity independently from organizational initiatives
- Bottom-up decision making
- Line departments that are more sensitive to user needs since they are in close proximity to the developers
- Clear lines of responsibility within the department
- Facilitation of Multi-tasking
- Multiple funding sources for large projects and initiatives
- Shared resources and costs between two departments or sub-divisions
- Willingness for staff to help each other.

When not implemented properly, the difficulties associated with a decentralized model include:

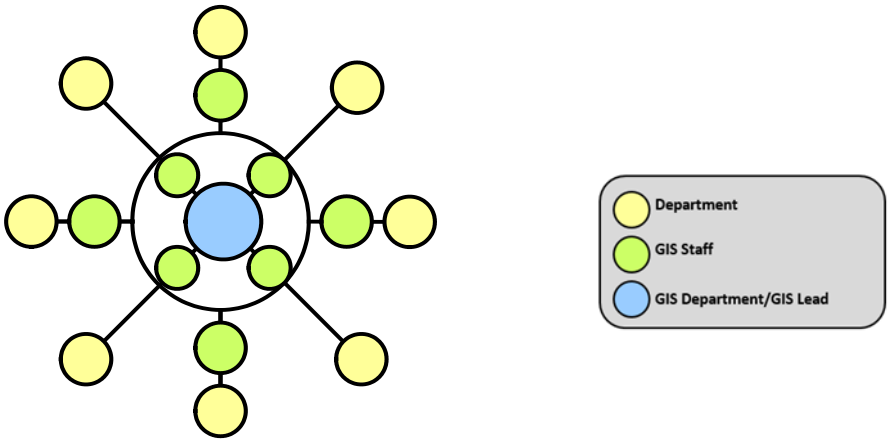
- Requires strong communications, paper work and bureaucracy to forge agreements between multiple departments
- Redundant roles and functions existing between departments
- Guided by individuals rather than by teams
- Multiple GIS and applications
- Databases and skills that are often fragmented throughout the enterprise
- Overhead costs that are not shared and often much higher
    - redundant effort in multiple departments
    - multiple copies of data being edited and stored in several locations
- Difficulty in standardizing software
- Poor data sharing and isolated databases

- Staff wearing multiple hats and sacrificing GIS competency to day-to-day departmental operations or tasks unrelated to the GIS field
- Staff competing with each other for funding or recognition instead of working together.

This model is often used in governments that do not have a strong GIS competency in a central location, especially smaller governments and those that initially begin using GIS. Small jurisdictions or single departments that have a low volume of GIS work depend on this model, especially when workers have to multi-task with departmental operational duties (i.e. wearing multiple hats). It also has a lower start-up cost for the departments and smaller jurisdictions that make it more attractive for first-time users.

This decentralized model could be used in Simi Valley. The benefit is a defined structure where stakeholders pool their resources and work together to build a GIS. The model is flexible and ensures that stakeholder needs are addressed. However, the risk is that it can become difficult to coordinate and negotiate. It requires strong communications and leadership to hold the system together. Redundant data capture, staff, funding, and initiatives often occur in this model. The City would need to be aware and implement many teams and committees to serve as a check and balance to the divergent needs.

Many local governments utilize a **hybrid** GIS organizational structure, based on centralized and decentralized organizational models. This type of structure provides the benefits of both organizational models in scenarios where full implementation of either organizational structure cannot be readily attained.



Hybrid or Matrix GIS Organizational Structure

A Hybrid/Matrix model uses dual accountability along functional lines. Each particular GIS function is listed in a matrix. The matrix is divided among the stakeholders who are grouped into functional teams. The teams

can exist either in a single department or serve multiple departments. Each stakeholder team is assigned a role that is closely related to their business function. Over time the individual team members become very competent at managing their smaller implementation piece. If a team member leaves or is on extended leave, then the function continues because the other team members in the matrix pick up the slack. The Hybrid model works very well in organizations of all sizes that can devote the time and money to fund the teams and to coordinate from a central staff person, central group, or business unit responsible for overseeing GIS while stakeholders focus on GIS related business requirements. When successfully implemented, the Hybrid model can benefit organizations in many ways, such as through:

- Shared costs
    - database management and maintenance
    - network and server resources
    - highly specialized GIS staff
- Improved efficiency
    - integrated multi-departmental solutions can be implemented
    - central data warehouse
    - team based processes (critical functions are no longer one person deep)
    - improved data quality
    - departmental ownership of relevant datasets is maintained
    - automated validation routines
    - real-time distribution of data
    - improved end-user support (Feedback from users is immediate since each team sits in close proximity to the work. They can hear and see firsthand what needs to be fixed.)

If not implemented successfully, the Hybrid model can be difficult for several reasons:

- Roles are not clearly defined, making expectations unclear.
- Unnecessary bureaucracy from too many standards or too many agreements and negotiations.
- No clear direction from leadership. Stakeholders end-up setting their own priorities and looking out for their own needs.
- Insufficient funding. Critical functions could be cut by a single department, hurting the remainder of the enterprise.
- Smaller departments with small staffs may be left out of the planning process and miss out on opportunities to participate.

The major benefit from the Hybrid model is its flexibility. Stakeholders actively participate in the design and project planning stages. Stakeholders work together while dividing and sharing the GIS functions. The GIS central body is responsible for overall professional direction, career development, GIS system architecture, applications, license pools, and delegating project work. The intra-departmental stakeholder teams are responsible for data capture, data edits, quality control and cartographic output. Stakeholders pool resources and cross-train team members from different departments. Redundancy is reduced, since there is a central command structure made up of a GIS Manager and key GIS technical staff. Flexibility and departmental expertise are ensured, since the stakeholder teams work within the departmental structure on specific end-user functions. If funding or leadership is lacking in a single department then the other departments compensate. Smaller departments are involved since they have equal share in the decision making process and they are supported by intra-departmental teams.

The Hybrid model risk is that if there is no clear direction and agreement among participants concerning roles and responsibilities, it may devolve into the decentralized model and redundant processes will emerge. There is a risk that too many formal agreements and formal meetings will make decision making confusing and hamper productivity. People may not understand the system and may make up their own systems just to be functional. Strong communications, GIS knowledge, and leadership are required to make it run. Simi Valley would benefit from the Hybrid model since it is a mature system with competent and well educated professional GIS staff. Simi Valley would see an immediate return if this model was adopted.

Definitions Summary of Organizational Structures

Centralized Organizational Structure:
All GIS tasks, except data viewing and analysis, are handled by a central GIS department or division. All GIS staff are located within the central GIS department or division.

Decentralized Organizational Structure:
GIS data updating and maintenance responsibilities are assigned to individual GIS-participating departments. Departments have their own GIS staff members.

Hybrid Organizational Structure:
GIS tasks may be handled centrally or at the department level, depending on the needs and available GIS staff at individual departments.

The table below ranks the potential benefits for each governance model. Additionally, it ranks the typical challenges that are faced when implementing a governance structure. Thumbs up and thumbs down icons are used to represent how each model performs for each element.

City of Simi Valley, California Governance Model Comparison Chart			
Potential Benefits to the Organization:	**Centralized Model**	**Decentralized Model**	**Hybrid Model**
• Clearly Defined Roles Reducing Conflicts or Confusion About Service • Enterprise Level Direction and Goals • Central Chain of Command (Top-Down Solutions) • Clear and Straight Forward (I need a map) • Quick and Fully Informed Decision Making • Predictable Format			
• Shared Costs Reduced • Database Management and Maintenance • Network and Server Resources • Highly Specialized GIS Staff			
• Achieving Stakeholder Needs • Departments Contribute GIS Input and Resources • Sensitive to Department and User Needs			
Potential Benefits to the Organization:	**Centralized Model**	**Decentralized Model**	**Hybrid Model**
• Reduction Duplication • Data (Multiple Copies of Data) • Effort (Data Creation and Maintenance) • Project Initiatives and Expenses			
• Improved Data Sharing/Integration with Other Business Systems • Enterprise Systems • Multi-Departmental Solutions • Central Access Point			
• Institutional Legacy • Team-Based Processes • Cross-training of Employees • Fail-Safe Critical GIS Functions and Tasks (beyond one person deep)			
• Clear Departmental Expectations • Responsibilities • Participation • End-user knowledge			

Expected Challenges to the Organization	Centralized Model	Decentralized Model	Hybrid Model
• Potential for Too Many Standards (formal agreements proliferate) • Too many meetings and committees • May Require Extensive Negotiations • Difficult to understand			
• Potential for too Rigid Standards (more time is devoted to following standards and the letter of the law and less to the original purpose of the program)			
• Funding Risks (if funding is suddenly cut) • All the eggs are in one basket			
• Exclusion of Smaller Departments (if everyone is not equal) • Funding • Service • Technology			
• Risk for Departmental System Isolation (everyone does their own thing) • Solo Initiatives • Lack Enterprise Cooperation • Risk of pull outs or refusals to participate			

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SIMI VALLEY GIS **ORGANIZATIONAL STRUCTURE**

A majority of Simi Valley departments/divisions will utilize GIS in various capacities. The utilization of GIS will vary from consistent daily use to sporadic use every few weeks or months. In addition, the knowledge and understanding of GIS technology is also variable within and among these departments, such that there are GIS users from each functionality tier (i.e., Flagship user, Analytical user, and/or Browser user).

The heaviest GIS use, as identified in this document, will continue to be in the following departments: Public Works, Police, Community Services and Environmental Services. However, all departments will have access to GIS applications and data. The table on the next page illustrates the current utilization of GIS at Simi Valley. It illustrates the current utilization of GIS by some departments and the overall lack of current utilization by other departments. Each department has identified the need for a holistic coordination effort aimed at managing an integrated enterprise GIS. Assessment and evaluation of the existing GIS organizational structure and staffing is critical for establishing a viable and successful GIS Coordination effort.

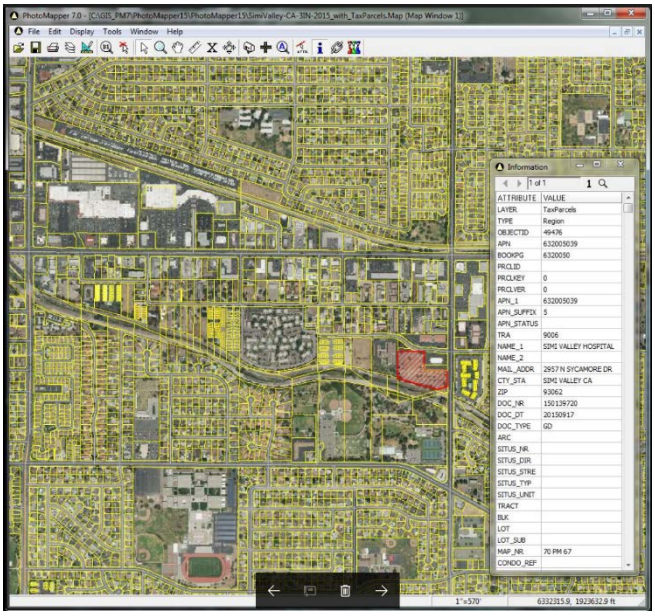
Based on departmental interviews and information gathering, GTG has determined that the City currently has a **hybrid** GIS organizational structure with **decentralized** tendencies. Historically staff within the organization have had to request data, mapping, and/or analysis from the GIS Team in IS and now Public Works. It was then incumbent upon the GIS Coordinator to prioritize each request while ensuring that all of the needs of the Public Works Department were being met first and foremost. As a result, the GIS for Public Works is extensive.

However, other departments have not advanced commensurately. GIS evolved within Public Works because of two primary reasons: 1) a big need for the technology and 2) Public Works had funding for the technology. This is not atypical. Many organizations start GIS within a heavy GIS using department, especially one that has adequate funding for the technology. However, it is important that Simi Valley recognize that GIS technology has matured in such a way that every department can benefit from daily access and use of the technology.

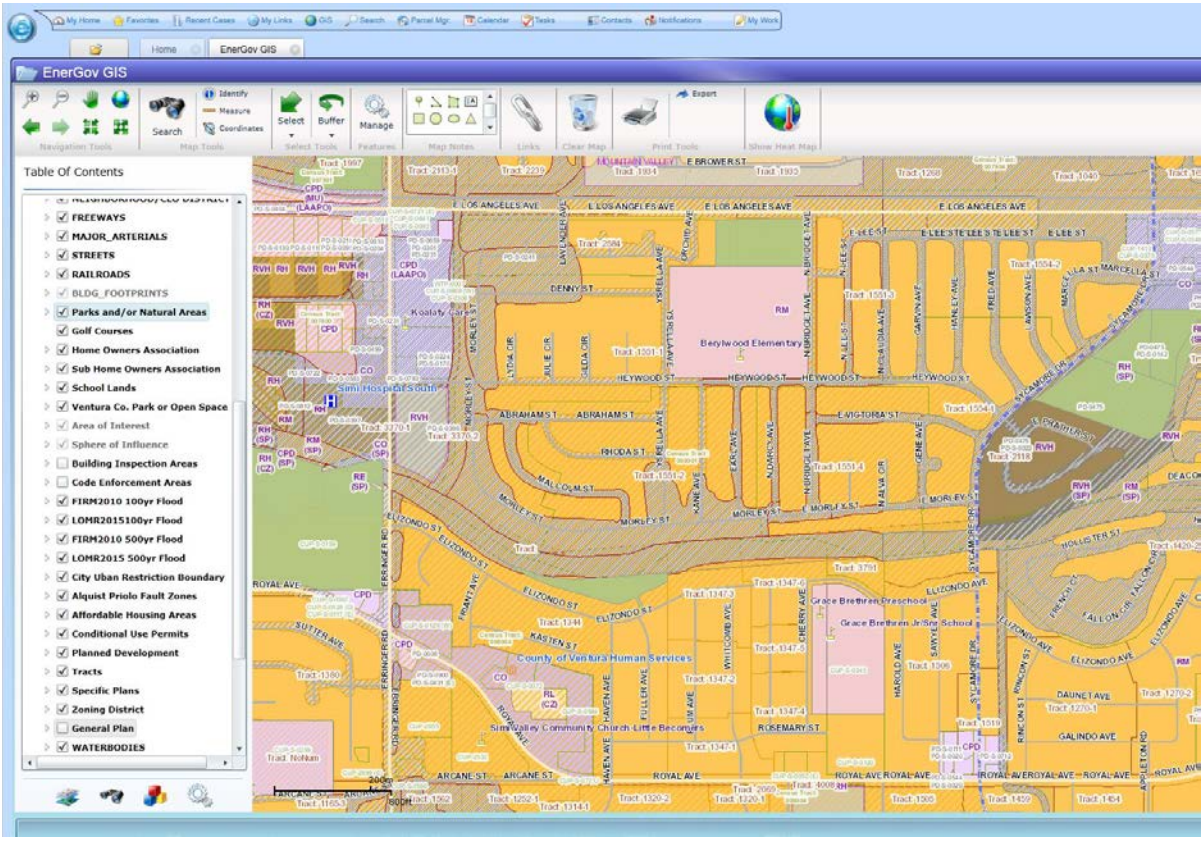
The GIS Coordinator has worked closely with departments to grow GIS. The following is just some of areas where GIS is currently used at the City:

- Economic Development
- Public Works
    - Street maintenance
    - Traffic
    - Waterworks
    - Sanitation
- Community Development
    - Land Management
    - Planning
    - Building and Safety
    - Code Enforcement
- Police Services
        - Dispatch
        - Crime Analysis
        - Mobile
    - Housing and Grants
    - Public Transportation
        - Bus Stops and Routing

The GIS Manager has strived to introduce hybrid characteristics and tools. Tools like PhotoMapper have allowed users to quickly visualize key information to include properties and aerials. Additionally, the Police Department has implemented tools (CrimeView) that enable internal staff and the public. The City has begun implementing EnerGov that will become the primary information system for Environmental Services and will be accessed by most departments. EnerGov comes with an advanced GIS browser that will allow staff to visualize and analyze data within EnerGov in conjunction with GIS layers. The GIS Coordinator supports these GIS portals that enable departments to use GIS without having to come to GIS staff in Public Works.



GIS Portals like PhotoMapper are moving GIS to the Enterprise



EnerGov GIS Portal

However, due to the lack of an adopted game-plan for enterprise-wide GIS the current structure makes enterprise GIS difficult to sustain. GIS data is housed in an entry-level version of ArcGIS for Server and no governance strategy has been formalized. The current GIS Coordinator in Public Works is tasked as the primary GIS resource for Public Works and assisting other departments as he can. However, it is imperative to understand that Public Works is the largest user of GIS and will remain so for the foreseeable future. Therefore, any governance strategy must embrace the importance of GIS for Public Works. Implementing a fully enterprise-wide GIS at the City will occur by defining and adopting a formal organizational structure that serves the needs of all departments while still satisfying the needs of Public Works.

The following table illustrates the current GIS use by department/division. 0 – not used at all, 5 – GIS is used to its fullest.

Existing Simi Valley GIS User Profiles						
City Departments	Usage Profile					
City Manager's Office	0	1	2	3	4	5
Community Services	0	1	2	3	4	5
Customer Services	0	1	2	3	4	5
Environmental Services	0	1	2	3	4	5
Information Services	0	1	2	3	4	5
Police Department	0	1	2	3	4	5
Public Works	0	1	2	3	4	5
Stakeholders/Public	0	1	2	3	4	5
0 No/Little GIS Use - 5 Maximum Utilization of GIS Technology						

4

DEPARTMENTAL **RESPONSIBILITIES**

Departments throughout the City use GIS to support their daily tasks and operations. Historically, departments have used a variety of GIS technologies to satisfy project-specific or ongoing needs. In some cases these departments voluntarily solicited input from GIS staff, especially when integration with other enterprise systems was obvious. For planning GIS projects, the expectations and responsibilities of departments are not clearly defined. To ensure optimal return on investment, the City should clearly define the roles and responsibilities of departments.

Definitions

The term **Role** refers to the typical expected or required behavior of individuals or departments. Roles include daily tasks and are often associated with departmental workflow, business operations, or citizen services.

The term **Responsibility** is often more nebulous than Role and refers to the duty or obligation of individuals or departments.

The term **Dual Accountability** describes the roles of individuals in the organization. Dual accountability means departments should adhere to overall corporate goals while satisfying the goals of their department. In an organization such as Simi Valley, staff is required to meet departmental operational goals but should also adhere to the overall needs of the organization's GIS goals. The term **Dual Accountability** refers to the idea that GIS users should have accountability at two levels:

1. **Team accountability**. The individuals have responsibilities to a specific function set which exists within a specific department or a consortium of departments. Team members participate in departmental work flows while performing daily tasks dictated by requests from end-users, customers or departmental staff. For GIS staff, this may include creating maps, editing data, gathering information or conducting analysis. The needs of the department are imperative and can often obscure the needs of anything beyond the task at hand, but in the long term, focusing only on the immediate needs of the department may not be meeting organizational objectives. If an organization focuses too much on departmental needs, organizational efforts suffer, which in turn, begin to affect the department's ability to meet its own needs.
2. **Enterprise accountability**. Individuals also have a responsibility to the enterprise-wide GIS effort to conduct daily business tasks in accordance with the goals set forth for the GIS. For departmental staff, this should include an understanding of the desired centralized structure of the database, the software that should be used, acceptable data formats and other organizational standards. Enterprise accountability includes formal and informal goals. It will be critical for a GIS lead staff person to communicate and train staff on goals and expectations. Communication mechanisms can include user group meetings, official city mandates, GIS communiqués and personal communication between central GIS staff and end-user departments.

Achieving a balance between these two levels of accountability is critical to enterprise GIS success and continued adoption. It will be incumbent upon a lead GIS staff person (GIS Manager) to balance these objectives. The City of Wilson, North Carolina implemented annual anonymous user surveys to elicit input on how well the technology was being implemented and the initiative's overall effectiveness. Implementing this type of initiative at Simi Valley would ensure that central GIS staff understands the needs of the departments while maintaining overall organizational standards and goals.

5

DESIRED **OUTCOMES**

A majority of City departments and the public will use GIS technology on a daily or weekly basis. Although the roles of the departments are well defined, the responsibilities are not as clearly defined, especially with regard to enterprise GIS responsibilities and expectations. Although departments typically work together and have achieved success with a variety of GIS initiatives, the lack of clearly defined responsibilities can create difficulties and inefficiencies. There is a strong desire at the administrative level to implement GIS technology responsibly and to maximize the enterprise-wide return on investment. Important issues include:

- Meeting the needs of the departments and citizens
- Maintaining data quality, security, and accessibility
- Improving efficiency and communication between departments
- Reducing redundancy and expenditures for overhead, data maintenance, and data storage
- Facilitating integrated and interoperable enterprise-wide systems
- Improving service to the citizens.

Earlier in this chapter, GIS governance models were defined and discussed. To facilitate the definition and implementation of an effective governance model and to help achieve the enterprise-level goals, there is a need to evaluate the current GIS departmental responsibilities and to determine how defining or modifying these roles may better facilitate responsible GIS growth.

CURRENT REALITY

Departments and divisions throughout the City typically have broad conceptual roles and mission statements. Often they define departmental roles and services in the context of larger organizational-wide initiatives with the overriding goal of providing the best possible services to citizens. The current roles of each department are discussed in the departmental needs assessment section of this study. This section addresses specifically the responsibilities that each department/division has or should have with respect to enterprise GIS governance.

INFORMATION SERVICES

Simi Valley's Information Services Division is responsible for a wide array of functions that encompass technological issues for the City. Information Services is responsible for management of corporate technological resources including computer hardware, software, Internet, Intranet, community networks, telecommunications, electronic office equipment, telephony, and the security of all operating systems in municipal departments. They are available to support the GIS Coordinator on technical issues but have no other role in GIS.

GIS COORDINATOR IN PUBLIC WORKS

The GIS Coordinator manages core GIS services for the City of Simi Valley. At most organizations, the GIS Coordinator's primary role is to support the City's GIS operations and spatial information needs. GIS is a common technology needed throughout the organization. A core responsibility of the GIS Coordinator is to manage centralized GIS layers and enterprise GIS services. In many ways, the current role of GIS Coordinator is divided upon being the GIS expert for Public Works, with only a smaller percentage of time dedicated to establishing an enterprise-wide GIS. While there are some stated and implied responsibilities of the GIS Coordinator to support departmental efforts, the departments currently have no official responsibility to the GIS Coordinator or to an enterprise GIS initiative. The following are some of the skills, roles/responsibilities currently required of the GIS Coordinator:

- Conduct Public Works GIS work
- Liaison to the county and external agencies
- Maintain base GIS layers
- Provide GIS technical support services
- Manages ArcSDE service
- Configures ArcGIS Server, ArcGIS Online, and other GIS portals

- Provides Web services application and system performance tuning
- Limited data validation and quality control – topology and domains
- Maintains and provides leadership concerning City web based GIS (ArcGIS Online and other browsing applications)
- Provides web service development and maintenance for internal and external web sites
- Coordinate and conduct project work for departments and division
- Provide user training services (limited)
- Troubleshooting application problems
- Provide interdepartmental services for data and mapping requests
- Provide technical leadership to GIS users
- Provide overall management for all contracted work
- Provide planning and direction for GIS growth to serve organization needs
- Provide overall management for all GIS implementation tasks

GIS EXPERTISE WITHIN OTHER DEPARTMENTS

Other departments have realized the critical nature of GIS for their tasks. As such, they have developed pockets of GIS expertise among existing staff (power users). None of these staff have GIS titles but are relied upon to provide GIS services to their department on occasion. For example, Police has a Crime Analyst whose job requires the use of GIS and the creation of GIS projects. Some departments utilize GIS client software for data manipulation, data creation, and analyses. For smaller departments these services are provided by the GIS Manager.

CURRENT SIMI VALLEY GOVERNANCE MODEL

Although not officially defined, the current governance model at the City of Simi Valley is a hybrid model. The GIS Coordinator primarily supports Public Works and as time permits, supports the entire organization in regards to GIS hardware and software, as well as data maintenance and expert advice. A few departments have developed pockets of expertise so that they can begin to use GIS in an independent fashion (Police and Environmental Services). Other departments rely on the GIS Coordinator for GIS services. What has begun to move the City towards a hybrid GIS is the implementation of intranet GIS portals that were intended to enable each department to do many of their GIS tasks on their own. However, this “portalization” of GIS is only in its infancy. The following graphic illustrates the current governance model at the City of Simi Valley. It illustrates graphically that GIS Coordinator in Public Works is at the hub of GIS for the City. Additionally, the relationship to other external entities is represented on the diagram. Each department circle is sized by current GIS usage.

The following are some of the key **existing conditions** in regards to Simi Valley GIS effort:

- No official governance model has been adopted
- Hybrid GIS
- GIS portals being introduced
- The GIS Coordinator serves as data warehouse custodian and technologist and the lead GIS staff for Public Works
- Heavy departmental users – Environmental Services, Public Works, and Police
- Moderate departmental users – Community Services
- Other low on non-existent GIS using departments – City Manager's Office, Administrative Services, and Stakeholders/Public
- The City works with Ventura County, consultants conducting work for the City, Channel Islands Regional GIS Collaborative (CIRGIS), and the various State of California agencies to acquire key data sets.
- GIS is operating with no coherent city-wide vision

Simi Valley Existing Governance Model Diagram

6
GAP ANALYSIS

GIS is a common need distributed across the City and GIS has been integrated into a few departmental workflows. Some departments have become dependent on the technology and, in many cases, were not guided by corporate goals. Other departments have many unmet needs that can be filled with enterprise-wide GIS integration. Increased GIS use has created a very real need for departments to share what initially was considered to be department-specific data. Variations in software, data format, and data quality can make this challenging.

The GIS Coordinator in Public Works has the responsibility to achieve Public Works GIS tasks (along with the Engineering Technicians) and to manage core GIS technology services for the City. Sharing data among departments is critical to these core services. While the GIS Coordinator clearly understands the need to define and maintain standards, current directives have not included standards for GIS technology, or clearly defined the roles for creating and maintaining the standards. Some of the standards that should be under the auspices the GIS Manager is:

- Naming conventions
- Data schema
- Data editing methodology (in collaboration with business area)
- QA/QC standards
- Training standards
- Work flow processes/procedures for GIS
- Mobile/Field GIS standards
- Application standards

- Data collection standards – to include any data collected across the City that is asset based should include an X,Y (See Data Chapter)
- Data storage (i.e. what should be in a central database and what could be stored locally/shared network location like project specific data)

Varied GIS departmental implementations and the lack of GIS standards force the organization to take a **reactionary approach to enterprise integration**. This is inefficient for several reasons:

- Difficulties may prompt departments to:
    - Support duplicate efforts
    - Establish standards and procedures on their own which may not be GIS best practices
    - Store data locally
- Processes are often not real-time, which degrades the temporal quality of data
- Efficiency of communication and data sharing between departments are reduced
- System integration is more difficult and sometimes impossible due to varying standards
- Understanding of service areas is overlooked

The following are some of the core **existing challenges** that are evident in regards to an enterprise-wide GIS:

- No Official Strategic Direction – no goals and objectives in place
- Need Centralization – need upgraded software ArcGIS for Server Enterprise
- Need Improved Digital GIS Data Layers – see data analysis chapter
- Need Additional Data Layers – see data analysis chapter
- Have Un-Met Needs (Increased Opportunity) – some department's needs are not being met
- Need for Temporally Accurate Data – some data layers are not updated as needed
- Technical Hurdles – application speed, functionality, technical support, and data access
- No Annual Training Plan – many users feel they are not being afforded adequate training

7

RECOMMENDED **ACTIONS**

To better meet the organizational GIS needs and to facilitate the desired outcome of an enterprise-wide GIS, the following actions should be taken:

- **A GIS Steering Committee (Management Team) must direct the enterprise-wide GIS**
- **Adopt a Hybrid Model and staff accordingly**
- **Formal City Management and IT Directives should be given with GIS included in discussions**
- **GIS Users Group should be a priority**

Each of these recommended actions is discussed in more detail below:

A GIS Steering Committee (Management Team) Should Direct the Enterprise-wide GIS

The City had an Executive Steering Committee for eight years but it was abandoned in 2007. A GIS Steering Committee guides most successful municipal enterprise-wide GIS implementations. The City should consider creating a GIS Steering Committee (can be termed GIS Management Team) to guide the implementation of this plan. This strategic plan includes many recommendations that cross departmental lines and affect the daily operations of most departments. Additionally, each department identified numerous public facing GIS opportunities that have cross-departmental impact. For these reasons, GIS decisions should not be left to only Public Works staff. If left with Public Works staff, this plan puts Public Works management in an awkward position, having to make decisions that significantly affect other departments.

Therefore, a GIS Steering Committee should be relied upon to guide GIS implementation development at a management level. The City must ensure that the GIS Steering Committee consists of upper management. A management-level employee, preferably the department head, should be on the Committee. This Committee's main function is to ensure that GIS is implemented effectively throughout the organization and that enterprise-wide goals and objectives are being met. The Committee should provide critical, high-level commitment to investment in GIS. Each member of the Committee will gain an understanding of the technology and feel some ownership in the GIS Implementation. These high-level participants will be indispensable during budgeting, and each will serve as a champion for GIS within his or his own department.

The GIS Steering Committee **should**:

- Initially meet monthly or quarterly to guide the further implementation of GIS at the City
- Focus on the high level GIS direction of the organization
- Include the GIS Coordinator
- Be comprised of high level department staff (preferably department heads)
- Receive formal presentations from the GIS Coordinator as to the direction and needs in regards to GIS
- Decide priorities founded on available funding and overall needs of the organization based on the identified needs of the up-to-date GIS Strategic Plan
- Make recommendations as to GIS priorities
- Understand and nurture GIS within their departments and the organization as a whole

The GIS Steering Committee **should not**:

- Meet at a frequency that is burdensome and unproductive
- Discuss the nuances of the GIS implementation such as hardware, software, etc.
- Be turned over to junior staff, which would defeat the purpose of the Committee
- Become a venue to advancing the individual goals of a department over the overall goals of the enterprise-wide needs

A GIS that fully benefits all departments and the public will not be realized unless a GIS Steering Committee guides the GIS.

Officially Adopt a Hybrid Model and Staff Accordingly

The Hybrid model discussed earlier in this chapter is being recommended as the model of choice for this enterprise-wide effort. This model alters how the organization operates and requires departmental staff to

adhere to the strategic direction of the City and specific best management practices established by a lead GIS Person (GIS Manager) and his team. The Simi Valley GIS is currently operating in a hybrid environment with the GIS Coordinator in Public Works providing technical leadership. The GIS Coordinator should lead the GIS effort at the City. The master plan serves as the rudder of the ship. However, the ship also needs a knowledgeable captain on board. All of the most successful GIS programs have a full-time program leader. Having this person is the most important component to GIS success because leadership can make or break the program and its associated projects.

The program leader is often referred to as the GIS Manager, GIS Coordinator, or GIS Director. In the case of Simi Valley, the title is GIS Coordinator**. It is recommended that the City consider changing the GIS Coordinator title to GIS Manager. This would better reflect the far-reaching and enterprise-wide nature of GIS at the City and the position high-level responsibilities.** The GIS Manager must have the technical savvy to run diverse operating systems, networks, and GIS software and the people skills to coordinate, sell, champion, teach and referee the implementation of this revolutionizing technology. This position must be seen as a City-wide asset and as such needs to serve the entire organization with autonomy.

To build a fully functional GIS, the GIS Manager will have to ensure that all departments get involved and that data are shared between departments. The GIS Manager should receive guidance from the GIS Steering Committee in regards to GIS priorities. Inevitably, departments will disagree on how a GIS should be implemented. Such issues can drive a wedge between departments, and many organizations never get through this stage. It is up to the diplomatic GIS Manager to see that disagreements are resolved in a manner acceptable to all parties. In Wilson, North Carolina, potentially divisive issues relating to accuracy and cost of data to the public arose between departments. These important issues were met head-on and resolved by gathering all involved parties before problems could occur. With the help of their GIS Manager, the users came up with a mutually acceptable solution.

Where to Locate the GIS Manager?

It seems natural to put the GIS Manager in the department that seems to need GIS technology the most. In many city governments, this is the Public Works or Planning Department. If Simi Valley is going to have a successful enterprise-wide GIS, the GIS Manager must be autonomous and able to serve all departments equally. One common method to achieve this autonomy is to put the GIS team in a non-GIS using department or a service department like the City Manager's Office or in Administrative Services.

When the GIS Manager is in a user department, there is a risk that the department gets much better treatment than other departments. The GIS Manager is faced with a dilemma: "Do I work on the project that will please my boss, or do I spend my time helping other departments?" More often than not, the Manager will satisfy the boss. For example, a GIS Manager in the Environmental Services department will develop a comfort level with planning issues and will tend to gravitate to GIS activities that further planning goals. Additionally, GIS staff within a GIS using department soon become experts in what that department does and as a result become more comfortable doing the tasks of that department. Other departments will soon feel isolated, grow resentful, and begin to lose interest in the GIS project. Support for the project as a whole will begin to erode. Instead of breaking down traditional barriers, this mode tends to erect new ones.

An organization like Simi Valley needs to decide, is GIS going to be promoted as an enterprise-wide asset in which each department is nurtured in regards to GIS use? This requires a commitment from leadership. Some departments who might have historically needed GIS but did not adopt its use will need to commit to GIS as part of their core functions. In the past, this was more difficult because the software was too difficult to use. However, today there are numerous tools that allow staff to use GIS easily to view and analyze data to get their job done.

Simi Valley can opt to keep GIS in a heavy using department (Public Works) and still promote enterprise-wide GIS. However, this typically results in a very high level of use within the department where GIS is housed and lesser use in other departments. Also, in these cases often the GIS staff are seen as the lead technologists for the department they are in. Therefore, if other technology projects are implemented they are seen as the ones to manage that project for their department. For example, the Public Works Department may eventually acquire a new CMMS/Work Order system. It would be natural to utilize the GIS staff as the key implementers and support staff for that system and they would do a very good job in that role. However, other departments will naturally be secondary in regards to GIS or feel they are secondary.

The City of Simi Valley needs to decide on the following:

- Do we want to push for the elevation of GIS as a primary platform for data dissemination and analytics for all departments and support this move at the highest levels or,
- Do we feel that the largest user of GIS, Public Works, is the primary user and as such should continue to house GIS because of the its crucial importance to Public Works operations and direct GIS staff to continue to promote GIS throughout the organization in an effort to elevate its use as time permits?

This model is still viable but might necessitate the use of external contractors to assist getting GIS established for other departments.

One change recommended in this plan is moving to a formalized hybrid environment. That means spending money and time creating and promoting intranet portals so that users in departments can use GIS themselves. The modern toolsets should provide a typical user with very intuitive methods of retrieving and analyzing the data they need and printing maps and reports. With the implementation of these modern toolsets the GIS Manager and any future team members will be freed from the time they spend doing GIS for users to enabling users to do GIS for themselves, thus resulting in a huge increase in GIS use and departmental uptake.

In summary, either of the proposed models (GIS in PW or a service department) will work depending on the focus of the organization. For example, the City of Bozeman, Montana houses its GIS in Public Works and they have no intention of changing their model. In their case, Public Works provides almost all of the funding and the Public Works Director is adamant that the technology is Public Works focused. Simi Valley, can opt for either model but needs to understand the challenges of either model.

Additional Resources

This GIS Plan has identified hundreds of layers that need to be created, maintained, and/or checked for quality control. Additionally, each department has identified a number of unmet needs including training, education, internal applications, external applications, data, mobility, analytics, and a host of other needs. Today there is only one enterprise GIS resource for the City, the GIS Coordinator. The GIS Coordinator has more than he can currently do to maintain the existing systems and perform his job duties. In the past, the City had multiple GIS staff but less work to do than is required today. Therefore, it is unreasonable to think that the GIS Coordinator can execute this plan without additional resources. To execute this plan and elevate GIS to the primary information platform for the City must consider the following options:

- Hire GIS Analyst(s) to assist the GIS Manager in implementing the recommendations in this plan.
- Hire a consultant to assist the GIS Manager in implementing the recommendations in this plan.
- A combination of both of the above.

The City needs to consider three options for the GIS Team as follows:

OPTION 1 – Keep the GIS Team in Public Works and Ensure Autonomy

GIS is very important for Public Works. Almost all they do has a GIS component. Currently, the GIS Coordinator is supporting the department and the organization. One concern with this model is that there is a risk to not allow the GIS Coordinator and any future GIS staff to serve all departments equally resulting in stifled GIS growth enterprise-wide. If the City elects to keep the GIS Team in Public Works, the following should be a focus:

- The GIS Coordinator must be autonomous. He must be able to serve all departments equally. The GIS Steering Committee would help direct priorities.
- The GIS Coordinator must be cognizant of including all departments and promoting GIS use within those departments.
- The GIS Coordinator should not be used for enterprise IS software implementation other than as GIS applies to those technologies
- The City should consider hiring a GIS Specialist or a consultant. These additional resources would allow for the implementation of the myriad of needs identified in this document.
- A second GIS Specialist should be considered as GIS continues to grow and mature.

There are reasons to continue to house GIS in Public Works to include the following:

- Continuity – GIS has recently been moved to Public Works. Moving it again to another department could cause confusion and appear that GIS is an orphan technology looking for a home.
- Necessity – The most prolific GIS using department at the City is Public Works. GIS is critical to managing the City's assets and infrastructure.
- Funding – Public Works has more resources than some other departments and as a result GIS in Public Works has a funding safety net when budgets are tight.

Option 1 – GIS Team Remains in Public Works (Hybrid Model)

OPTION 2 – Move the GIS Team out of Public Works into the City Manager's Office

In this option the GIS Team is moved to the City Manager's Office (CMO). The CMO takes a broad view of the organization and serves to coalesce information and direct operations holistically. The central GIS should be seen as an organizational asset that is available for everyone. The GIS team would be tasked with serving all departments equally. It may be advantageous for the GIS team to be in City Administration because:

- GIS would be elevated and given gravitas with its inclusion in City Administration
- GIS would get additional visibility among decision makers
- GIS would be better understood as an organizational asset leading to prioritization in funding
- Departments would see the organizational buy-in and deliberate move to an independent GIS
- The City should consider hiring a GIS Specialist or a consultant. These additional resources would allow for the implementation of the myriad of needs identified in this document.

- A second GIS Specialist should be considered as GIS continues to grow and mature.

In this scenario, Public Works would still merit a GIS focus. The existing Engineering Technicians would remain in Public Works to maintain their data sets.

Option 2 – GIS Team Moves into the City Manager's Office (Hybrid Model)

OPTION 3 – Move the GIS Team out of Public Works into Administrative Services as a separate group from Information Systems

In this scenario, the GIS Manager/Team is moved into Administrative Services. Like the CMO, this allows the GIS team to be seen as more of an autonomous enterprise-wide asset. It may be advantageous for the GIS team to be in the same department as Information Technologies because:

- GIS would be in a service department and seen as an organization-wide asset
- The GIS Team would have direct access to other IS professionals creating a team-work environment
- The GIS Team would have a better chance of being included in all technology decisions for the City

- The City should consider hiring a GIS Specialist or a consultant. These additional resources would allow for the implementation of the myriad of needs identified in this document.
- A second GIS Specialist should be considered as GIS continues to grow and mature.

In this scenario, Public Works would still merit a GIS focus. The existing Engineering Technicians would remain in Public Works to maintain their data sets.

Option 3 – GIS Team Moves into the Administrative Services Department (Hybrid Model)

Risks for Each Option

Each of the above options have inherent risks that should be understood and guarded against as follows:

- Option 1 – GIS remains in Public Works
    - GIS is seen as a Public Works technology and therefore not adopted by other departments
    - GIS is seen as a Public Works technology by organizational leaders and therefore not leveraged as it should be for enterprise-wide issues

    - Lack of access to Information Services
        - Seen as an us against them technology (GIS vs. IS)
        - Not given the needed access to IS staff delaying needed upgrades or support
        - Not being included in core IS decisions (new systems, databases, networking, etc.)
    - The GIS team serves Public Works first (reality or perceived)
    - Smaller departments left out
- Option 2 – GIS moves to the City Manager's Office
    - The GIS Team is relied on too heavily for the City Manager's Office tasks and not allowed to serve all departments equally
    - Lack of access to Information Services
        - Seen as an us against them technology (GIS vs. IS)
        - Not given the needed access to IS staff delaying needed upgrades or support
        - Not being included in core IS decisions (new systems, databases, networking, etc.)
    - Perception by departmental staff of the GIS team being too highly placed and therefore unapproachable
- Option 3 – GIS moves to Administrative Services
    - IS perception of being "techies" and not understanding departmental needs
    - Risk of becoming unapproachable and a "behind-closed-doors" technology
    - Lack of access to high-level decision makers
    - Seen as a technology (software and hardware) instead of a holistic platform for information dissemination

Placement Recommendations

Based on the information discovered throughout this strategic planning process, it is recommended that GIS remain in Public Works for now. Staff did not express a concern about its current placement and see GIS as an enterprise-wide asset. However, there was a major concern about not having enough staffing resources to accomplish all of the needs. Each of the options described on the previous pages could work. Each of them have pros and cons. It is important for the City to evaluate the program annually through user questionnaires and to track success and satisfaction metrics. If it becomes apparent that GIS is not truly meeting the enterprise-wide needs of the organization because of its placement in Public Works, then other alternatives must be considered.

GIS Manager Responsibilities

As previously discussed, it is critical that GIS become autonomous and that the organization is educated on what this means to each department. This would allow for the further growth of GIS at the City. The following is a list of primary job responsibilities recommended for the central GIS Team (GIS Manager and future staff):

- Set software and hardware standards for all geospatial technology
- Work closely with the power users in various departments (Environmental Services, Police, Community Services, and Public Works)
- Approve the acquisition of all geospatial software and hardware (GIS, GPS, AVL, others)
- Set database standards for all GIS data
- Implement geodatabase standards and designs for key data sets
- Enforce quality assurance and quality control standards for all GIS data
- Provide and approve GIS educational opportunities for the organization
- Facilitate the ability for departments to maintain their own GIS layers where appropriate
- Select and provide enterprise-wide tools for departmental staff to conduct geospatial analysis and browsing
- Select or approve public facing geo-spatial portals
- Provide mechanisms to geo-enable existing non-GIS databases
- Oversee and administer a communications plan for GIS
- Maintain and enforce the use of a GIS help desk
- Conduct an annual user satisfaction survey
- Conduct an annual return on investment analysis of GIS at the City
- Provide technical expertise for the creation of specialized GIS products or analysis

Departmental Responsibilities

The following is a list of GIS duties that should be done by end-user departments:

- Maintain staffing levels to support departmental GIS need – having a formal central GIS Team does not abrogate departmental authority for providing resources for their own needs
- Utilize enterprise-wide data viewers and tools to create maps and reports as needed
- Maintain departmental specific data layers as appropriate
- Participate in the use and growth of geospatial tools
- Ensure that staff attend the internal training classes on GIS where appropriate
- Utilize the GIS help desk
- Give candid feedback to the central GIS staff as to how GIS is meeting their needs

Additionally, staff working on GIS projects should be accountable to their own department but also to the GIS Manager. This dual accountability can only work if this model is officially adopted by the organization and the GIS Steering Committee.

The Hybrid model can be modified to accommodate current mission critical and department based GIS operations, as well as lay the foundation for enterprise level ownership and corporate oversight of many current and future GIS processes.

Formal City Management and Technology Directives should be Given

City management will need to clearly define and effectively communicate the responsibilities of departments, issuing directives that give the GIS Manager the authority to set enterprise-wide GIS standards. Departments should then work within this framework to complete their specific GIS tasks. To effectively and efficiently move forward, the GIS Manager should continue to support and integrate existing GIS initiatives while working towards enterprise standardization and creating a comprehensive list of accepted standards.

There are different kinds of decisions to be made both from an enterprise and a departmental perspective around GIS strategy, architecture, infrastructure, business applications, data, and investments. There are many nuances to each of these and there are no one-size fits all to who is ultimately responsible for these decisions. However, the following can serve as a guideline for the decision making process and authority for making these decisions:

- GIS strategy – the basis for this is the GIS Strategic Plan. This document should be updated annually to reflect the previous year's progress and changing priorities. The strategy for these

recommendations should be vetted by the GIS Manager and key recommendations approved by the GIS Steering Committee.

- Architecture and Infrastructure – this strategy should come from the GIS Manager with consultation with key IT technical staff. However, it is important that the GIS Manager continue to receive feedback from the users to ensure that the architecture is meeting their needs. The recommended annual user satisfaction survey will be one of many methods for receiving feedback from the departments. As a check to this process, any architectural bottlenecks should be brought to the attention of the GIS Manager and the GIS Steering Committee members so that the issues can be addressed.
- Business applications – this strategy should come from the GIS Users Group and Departments in coordination with the GIS Manager and his future team. This method will ensure that all affected parties have the ability to discuss functionality and have input into the selected applications and features that are included.
- Data - this strategy should come from the GIS Manager in coordination with the end user departments. The GIS Manager will set data standards and give guidance as to collection methodologies, accuracy, and other key data elements.
- Investments – the annual strategic plan update should refresh the priorities and make investment recommendations. Direction in this area is one of the core functions of the GIS Steering Committee. The Steering Committee should guide and approve the investment made in enterprise GIS. In some cases, these investments will be made by specific departments and in other cases should be included in a central GIS budget.

Again, it is important to note that there are many nuances to GIS implementation and propagation. There are exceptions to the guidelines above. However, it is incumbent upon the GIS Manager and team to communicate with end users and the GIS Steering Committee to ensure that each of the decision making needs are appropriately addressed.

A GIS User's Group Should be a Priority

A GIS User's Group should be made a priority. The User's Group should be a group focused on education and idea sharing. The group should include GIS-utilizing staff from all departments with identified GIS needs and be led by the GIS Manager. A GIS Users Group meeting provides an excellent opportunity for communication between all GIS users and is a good venue for the group to share their successes and failures. Duplication of efforts will be minimized and sharing of ideas and data will be optimized. A GIS Users Group is also a great

platform for internal training initiatives and is the venue where initiatives and successes of each functional GIS team can be shared.

Recommended Functions of a GIS User's Group

- The group should meet at least once per quarter and discuss the following items
    - Current GIS projects
        - Each department/division should share details on current GIS projects, including showing maps and data
    - Upcoming GIS projects
        - Ideas on how best to accomplish the projects should be shared
    - Industry trends
        - New software releases, new hardware, and networking issues should be discussed
    - New databases or changes to existing databases
    - Upcoming GIS conferences and/or training/webinars
    - Organizational and staffing issues
    - Joint project initiatives
    - New funding sources
- Have a way to communicate effectively with all members of the users group (e.g. email, Twitter, Facebook, Meetup.com, webpage)
- Maintain an internal Blog and/or discussion forum
- The quarterly meeting should also contain a brief technical session
    - A user should be able to conduct a how-to seminar on some aspect of the GIS
    - New functionality within Esri tools (version 10.x) could be an item for discussion
        - Improved Security
        - Geodata – support for new workspaces, ability to modify field properties on supported DBMSs
        - New Analytical Tools
        - Improve Mapping and Reporting
        - 3D GIS
        - New Imagery Tools
        - Improved Publishing Abilities
        - Optimized Hot Spot Analysis

- Use survey methods such as SurveyMonkey.com to gauge presentation interests of the user group members
- Participate and an annual user satisfaction survey
- Members should be GIS liaisons and ambassadors for their respective departments
- Participate in GIS Day
    - Leverage the press
    - Reach out to elected officials
    - Reach out to the public
- Provide mentorship to local schools and universities

Things a GIS User's Group Should Avoid

- A GIS users group should not force users to present or speak unless they are willing
- Do not spend a lot of time on one particular topic – a general rule is 10 minutes per topic
- Avoid bashing each other's technology choices or methods – the meeting should be a friendly environment with constructive criticism provided when needed
- Be dominated by one or two strong personalities
- Be central GIS staff pontificating and always delivering the material

8

SWOT ANALYSIS

A SWOT Analysis is a strategic planning method used to evaluate the strengths, weaknesses, opportunities, and threats as they relate to a topic. GTG staff based on the on-site interviews performed a GIS SWOT analysis. The results of the SWOT analysis are being utilized to make recommendations in regards to advancing an enterprise-wide GIS. The SWOT analysis follows:

STRENGTHS - characteristics that place Simi Valley at an advantage for implementing an enterprise-wide GIS

- Enthusiasm, desire, and identified needs all serve to make this a great time to advance GIS enterprise-wide.
- A number of existing successes have laid the groundwork for future successes.
    - Implementation of Esri Software
    - Base layers and other data layers
    - A number of successful and documented projects
- Expert level staff exists at the city in various departments
- Leadership – the city has recognized the power of GIS and desires to move the GIS to the enterprise.
- A wealth of existing data

WEAKNESSES - challenges which may arise for the City when implementing an enterprise-wide GIS

- A GIS Manager that has not been directed to serve all departments equally
- Lack of a clearly defined GIS governance structure
- Staffing levels are inadequate. At least one or two more GIS staff should be hired or a consultant used to assist on implementing various projects found in this plan.

- Financial constraints
- Competing priorities – the city has many non-GIS projects on-going
- Lack of training and education
- Data inaccuracies – attribution, position, and temporal
- No uniform mobile solution
- Speed and performance of existing tools
- Lack of metadata and data standards

OPPORTUNITIES – items that will improve organizational effectiveness and efficiency as the City implements an enterprise-wide GIS – Return on Investment (ROI)

- Public access and public involvement
- Formalized governance that enables all users (internal and external)
- GIS integration with existing systems (adding value to those systems)
- Return on Investment impact
- Easy-to-use tools
- Using GIS in the field (mobility)

THREATS - issues that the City may encounter that could threaten the further implementation of an enterprise-wide GIS

- State and federal mandates that slow data dissemination
- Reluctance to change – culture shift
- Losing departmental buy-in because of inadequate staffing resources to accomplish needs
- Budgeting – must justify spending via return-on-investment possibilities
- Not implementing an enterprise-wide GIS governance structure
- Too technical/complex - getting the right tools into the hands of the users
- Focusing too much on other initiatives at the expense of GIS
- Erroneous data undermining the validity of GIS
- Lack of integration with other systems (stovepipes)

GIS at Simi Valley has progressed steadily over the past few decades. Much money and effort has been expended on GIS. The City is at a point where an enterprise-wide focus on GIS will yield many benefits. However, for success to occur the recommendations detailed in this chapter must be followed.

DATA AND DATABASES

CITY OF SIMI VALLEY

CALIFORNIA

GIS Strategic Implementation Plan

SECTION OUTLINE

1

DEFINITIONS AND CONCEPTS

The following chapter summarizes the existing data and database conditions, desired data layers, and departmental comments in regards to data. This chapter also included a comprehensive digital data assessment of key base layers. Data is the bedrock of a GIS. Without comprehensive and reliable data, GIS is of little use. GIS data should be seen as a very valuable City asset. The data discussed throughout this chapter has taken decades to compile and represents millions of dollars of effort and capital outlay. Therefore, the City should take great care to maintain, improve, disseminate, and document this asset. Not only does the data serve to allow users to view and analyze facets of the City, it allows users to create derivative (new) data sets that reveal patterns and intelligence that can in no other way be revealed. The following table is a summary of major findings in regards to data that have been discovered as part of this analysis.

City of Simi Valley Data and Database Findings
Lack of standards – no city-wide standards for data collection and maintenance have been established and no data standard operating procedures (SOPs) exist.
Accuracy of data layers – there is a mix of data accuracy and completeness.
Simi Valley's GIS data was migrated to the LGIM model in 2013 by a 3rd party consultant. This is a positive for the City, because once the City moves to ArcGIS Online based intranet portals, the data will already be standardized. New data created should continue to be configured to the LGIM, to ensure standardization and continuity for future GIS staff.
Need to improve data creation/collection procedures across the enterprise – there is an opportunity to improve and standardize data collection procedures. Additionally, there is an opportunity to change City operations so that x,y coordinates are collected as staff gathers information in the field, giving data a geospatial component that it currently does not have.
Need to incorporate non-spatial data - Citywide there are a multitude of spreadsheets and Access databases. Where applicable, location data needs to be captured in these databases so they can readily be assimilated in the GIS.
No uniform approach to Mobile GIS – data collection and maintenance in the field has become more important as technology has advanced. It is important that the City decide on SOPs and a uniform approach to mobile GIS efforts.

2

DIGITAL DATA ASSESSMENT

Introduction

GTG performed an analysis of the four key digital data layers (address points, parcels, street centerlines, and orthophotography) in regard to existing condition, layer health, and update responsibilities and recommendations. Additionally, an analysis of key Public Works layers was performed. A detailed breakdown of these layers will be given, including their history and current status, as well as recommendations for future use with regards to the City of Simi Valley's GIS initiative. Issues related to base map dataset quality, content, completeness, and resolution must be thoughtfully analyzed, planned, and implemented. Fundamentally, these parameters encompass all functional GIS data layers (base and auxiliary), and specifically pertain to spatial accuracy, geometric accuracy, and attribution within these given layers.

Existing Digital Data Layers

Base Data Layers

GIS data within the local government environment can generally be categorized into two separate roles, base and auxiliary. Base map layers, both primary and secondary, are critical to the local government's GIS enterprise and will provide the foundation that most GIS functions and applications are built from. For local governments, such as the City of Simi Valley, a base map typically is comprised of four primary base map layers:

City of Simi Valley Primary Base Layers
1. Parcels
2. Road Centerlines
3. Orthophotography
4. Address Points

Simi Valley also considers City Limits and Water Bodies Citywide base layers. In addition, the City's Public Works data layers (water, sanitary, and storm) are considered secondary base layers. These layers can be used to create a variety of maps for both organizational and public use. In addition, these layers can be used in GIS applications to effectively manage and coordinate several City functions, including land use management and planning, public works tasks, emergency management services, and a variety of other applications that rely on these layers for reference and spatial analysis. It is crucial for these base layers to be spatially accurate, completely attributed, and consisting of all necessary fields, as auxiliary data layers will need to be overlaid upon these foundational base layers.

Auxiliary Data Layers

Auxiliary data layers serve important functions within local government GIS enterprises, but are often department-specific and related to a particular task as opposed to being incorporated citywide or interacted with on a day-to-day basis. When enacted, these layers are overlaid on base map layers to provide supplemental information, functions, and extensions. Auxiliary data layers for the City of Simi Valley include but are not limited to:

- Elevation/Contours Census Data
- Flood
- Fault Lines
- Bus Routes/Stops
- Neighborhoods
- School Zones
- Sidewalks
- EOC Operations Centers
- Water works District
- Utility grids

Simi Valley also has access to LiDAR data that was collected in 2005 and 2016. While the City has recent orthophotography, LiDAR can reveal many terrestrial characteristics that general aerial photography cannot. For areas such as Simi Valley that have diverse terrain, LiDAR can be an invaluable tool for land use planning and other environmentally related projects. LiDAR can be used in cooperation with the City's GIS system and create enhanced maps reflecting accurate terrain. The City can use LiDAR to track erosion and deposition and review development plans with the data.

Staff mentioned that there are a multitude of other databases across the City containing asset information in either Excel Spreadsheets or Access Databases. Staff that maintains and records this data need to include characteristics such as XY coordinates or address points to make sure the GIS Team has the capacity to geoenable this data. GIS Staff needs some kind of locational tie included in the data to be able to map the data.

GIS Digital Data Assessment

The following table includes each of the key data layers for the City of Simi Valley, how each layer should be created/maintained, who should be responsible for the update/creation of that layer, the existing condition of the layer, and how often it should be updated.

Legend

Data Layer	This column identifies the data layer by name. The data layer is the GIS thematic data that is being described. The name of the layer or description of the layer is placed in this column.
Creation Methodology	This column describes how the layer was, or is, anticipated being created.
Recommended Update Division or Individual	This field outlines the division or individual that is anticipated to maintain or develop the data layer during and after full implementation of the Citywide enterprise GIS. Development of new recommended layers will be prioritized for each year of the Implementation Plan.
Layer Status	Layer state of existence defined as follows:
Existing	These layers currently exist within the City's GIS.
Recommended/ Desired	These layers are recommended for development or procurement, based on departmental and enterprise needs. These data layers will help support existing business procedures or will compliment other GIS data sets that are already existing and in use by the City. Costs for these recommended layers will be based on general estimates – actual cost may vary.
Partial	These layers currently exist in an incomplete or outdated state

Recommended Grouping	This field outlines logical grouping of layers "features" into different feature datasets within the Enterprise Database. These groupings are based on the data structure defined by Esri's **Local Government Information Model** (LGIM). A system like this should be used for the Published Enterprise Database.
Address	This dataset contains point address features such as the site address and other feature classes required for the administration of address information.

Administrative Area	This dataset contains municipal, school and other related administrative or jurisdictional boundaries.
Assessment Information	This dataset contains a series of assessment operational layers derived from the integration of GIS and CAMA/Tax systems including tax districts.
Cadastral Reference	This dataset contains a series of features used to describe the cadastral reference system (PLSS, Control, etc.).
Capital Planning	This dataset contains a series of features derived during the capital planning process. Model results are stored within this feature dataset and used as inputs to the capital planning process.
Citizen Service	This dataset contains a series of features (service requests, parcel markups, etc.) collected by citizens through focused citizen engagement applications.
Demography	This dataset contains a collection of features used to report information about human geography including census blocks and tracts.
Election Administration	This dataset contains a collection of features used to administer elections and publish elected representatives including polling places and voting precincts.
Election Results	This dataset contains a collection of features created from precinct geography and the results of specific election contests. These layers will be updated at regular intervals on election night and used to publish results in focused web applications.
Elevation	This dataset contains a collection of features that describe the physical terrain including spot elevations and elevation contours.
Emergency Operations	Support data including evacuation areas, damage assessments, access points, etc.
Executive Reporting	Collection of features used in management reporting by executives and management staff.
Facilities Streets	Various facilities associated with streets including streets, buildings, curbs, ramps, guard rails, poles, trees, etc.
Field Crew	This dataset contains a series of features used to manage field crews with ArcGIS Mobile.
Fire Service Operations	Collection of features used by fire service professionals to preserve life, property, and promote public safety.
Infrastructure Operations	This dataset contains a collection of features used to capture public infrastructure operations information.
Land Use Operations	Data includes code violations, permits, work orders, and code violation cases.
Land Use Planning	This dataset contains a collection of features used to inventory land use patterns including flood zones, current and proposed land uses, and zoning.
Law Enforcement Operations	This dataset contains a collection of features used by law enforcement professionals to protect life, property, and promote public safety.

Parcel Editing	This dataset contains a series of features used to manage land records information. Subs, condos, lots, tax parcels, and encumbrances are managed in a parcel fabric.
Parcel Publishing	Published parcel data including tax parcels, encumbrances, and blocks.
Raster Data	External to the LGIM and stored in a separate geodatabase. Raster imagery such as aerial photography, satellite imagery, and LiDAR, and GIS grids and surfaces.
Public Safety Planning	Data including emergency facility locations, special events, and historic damage assessments.
Reference Data	This dataset contains a collection of features that provide geographic context in a community including building footprints, street centerlines, soils, vegetation, and water bodies.
Sewer Stormwater	This dataset contains a collection of features that represent the separated and combined sewer features in a community including gravity mains, manholes, lateral lines, clean outs, etc.
Stormwater	This dataset contains a collection of features that represent the stormwater network in a community including gravity mains, inlets, culverts, manholes, etc.
Telemetry	This dataset contains vehicles, stationary devices, and other assets that allow remote measurement and reporting of information from the field.
Water Distribution	This dataset contains a collection of features that represent the water distribution network in a community including pressurized mains, valves, hydrants, etc.
Custom FD	Custom Feature Dataset that is not included with the standard LGIM data model. Necessary to support data not normally found in the LGIM.
MultiSpeak Data Model	ESRI developed data model that supports electric utilities and conforms to the industry-standard MultiSpeak specification.

Recommended Update Frequency	This Column provides a recommended minimum of how often these data layers should be updated. In order to have an accurate and up to date GIS, layers must be updated on a set schedule. This is provided as a guideline on updating the listed data layers.
Daily	These layers should be updated on a Daily basis; mostly these are automated layers from other databases or applications.
Weekly	These layers are recommended to be updated or checked for updates on a Weekly basis.
Quarterly	These layers are recommended to be updated or checked for updates on a Quarterly basis.
Annually	These layers are recommended to be updated or checked for updates on a yearly basis. All layers that are not updated within a year should be checked for updated or updated at least once a year.
As Needed	These layers are updated based on an As Needed basis. These layers may be updated daily/weekly. Many of these layers are high use layers.

Every 2 to 4 Years	These layers are recommended to be updated or checked for updates every 2 to 4 years.
Every 10 years	These layers are recommended to be updated or checked for updates on 10-year basis.
Historical	These layers are kept for historical purposes and should not be updated.
Automated	These layers are automatically updated.

Core Data Layers

Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
Parcels	Digitized from paper maps and plats by a consultant in the 1990s. Parcel lines updated internally using source documents. A quarterly update of assessment data is linked to the parcels via PIN	GIS Team	Parcel Editing	Existing	Daily
Orthophotography	Color orthophotography derived from a fly-over. Multiple years. Part of CIRGIS initiative. Have aerials from 2001, 03, 05, 07, 10, and 13, 15	Static Map	Raster	Existing	Every 2 To 4 Years
Street Centerlines	Derived from aerial photography. Originally acquired from the Fire Department. Has been modified and enhanced by City GIS Team.	GIS Team	Reference Data	Existing	Weekly

City Boundaries	Digitized from source documents	GIS Team with Environmental Services	Administrative Data	Existing	As Needed through Annexations, etc.
Water Bodies	USGS – ponds, lakes and streams from national dataset. Received from the County years ago	GIS Team	Reference Data	Existing	Verification with updated Orthophotography every 2-4 years
Address Points	Was compiled as part of a Police Department Project 13 years ago. Points at every entrance. Main address for condos	GIS Team	Address	Existing	Daily

Auxiliary Data Layers

Data Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
3rd Party Fiber Networks	Digitized by 3rd party agencies	Automated	Reference Data	Desired	Quarterly
Arrests and Citations	Extract, cleanse and automatically map from RMS.	Automated from Versadex	Law Enforcement Operations	Existing but needs to be automated	Automated
Aside Bank Trigger Locations	Tracked in a database then geo-enabled	Police Record	Law Enforcement Operations	Desired	Automated
Assessor Data	Digitized	Ventura County	Assessment Information	Desired	Quarterly
Available Properties	Economic Development Records	Economic Development	Land Use Planning	Recommended	Weekly

Data Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
Available Spaces	Economic Development Records – should be tracked in a database and then geo-enabled	Automated	Land Use Planning	Recommended	Weekly
Billing	As-builts and GPS collections, automated from billing applications	Public Works and Administrative Services	Reference Data	Partial	Automated
Building Footprints	Capture from Aerial Photography	Public Works/Environmental Services	Reference Data	Partial	Quarterly
Building Licenses	EnerGov Integration	Automated	Land Use Operations	Desired	Automated
Bus Routes	Digitized	Community Services	Reference Data	Partial	Annually
Bus Stop Locations	Digitized	Community Services	Reference Data	Partial	Annually
Business Locations	Some data is in-house rest will be provided by Dun and Bradstreet	Mined from existing databases	Reference Data	Recommended	Automated
California Environmental Information	Downloaded from State Websites	GIS Team/Environmental Services	Reference Data	Desired	As Needed
Calls for Service	Extract, cleanse and automatically map from dispatch databases.	Automated from Versadex	Law Enforcement Operations	Recommended	Automated

Data Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
Camera Feeds	Tied by unique number to a GIS layer and viewable within applications	DOT, Dashboards, Private Feeds	Law Enforcement Operations	Desired	Automated
Capital Improvement Projects	Digitize from base map data; aggregate layers as needed	Various	Capital Planning	Recommended	Automated
Catch Basins	Digitize From As-Builts and other Source Documents	Public Works	Infrastructure Operations	Existing	Annually
CCTV Data	Tied by unique number to a GIS layer and viewable within applications	Police in conjunction with GIS Team and Public Works	Law Enforcement Operations	Recommended	Automated
Census Data	Download from Census Bureau	Community Services/GIS	Demography	Existing	Annually
CERT Team Members Personnel Data	Tracked in a database then geo-enabled	Emergency Services Records	Public Safety Planning	Desired	As Needed
Churches	Digitized	Community Services	Reference Data	Desired	Annually
City Owned Property	Extracted from Parcel Layer	GIS Team	Infrastructure Operations	Recommended	Quarterly
City Trees	Existing in current Arbor Pro Layer/GPS Collection in the Field	Public Works	Facilities Streets	Existing, needs updating	Quarterly

Data Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
Claims against the City	Risk Manager Records MS Access	Automated Geo-Enabled	Reference Data	Recommended	Quarterly
Code Enforcement	Extract from Code Enforcement database in Accela, cleanse and geocode from database	Community Services-Automated	Land Use Operations	Desired	Automated
Conditional Use Permits	Extract from EnerGov database, cleanse and geocode from database	Environmental Services	Land Use Operations	Desired	Automated
Crime Data	Extract, cleanse and automatically map from RMS	Automated from Versadex	Law Enforcement Operations	Existing but needs to be automated	Automated
Critical Businesses	Tracked in a database then geo-enabled	Emergency Services Records	Public Safety Planning	Desired	Quarterly
Crosswalk	Digitize	Public Works	Facilities Streets	Partial	Annually
DEMS Database	Extract from Accela permitting software and geo-enabled	Community Services, Environmental Services and Police in conjunction with GIS Team	Land Use Operations	Desired	Automated
Development Agreements	Digitized	Environmental Services	Land Use Operations	Recommended	As Needed
Dinner Night Locations	Digitized	Community Services	Reference Data	Desired	As Needed

Data Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
Dog Licenses	Integration with database selection	Automated	Reference Data	Desired	Automated
Drug-free zones around schools and churches	Buffer appropriate properties.	Police in conjunction with GIS Team	Public Safety Planning	Recommended	As Needed
Employee Location	Existing data in HR database	GIS Team	Reference Data	Recommended	Quarterly
Encampment Trash Layers	Collected using a mobile application	Police and Community Services	Reference Data	Desired	Quarterly
Environmental Information including earthquake faults, liquefaction zones etc.	Import	Ventura County	Land Use Planning	Desired	As Needed
Evacuation Routes	Extract from Street Centerline Data	Emergency Services in conjunction with GIS Team	Emergency Operations	Recommended	Quarterly
Facilities	Digitize	Public Works	Infrastructure Operations	Partial	As Needed
Film Areas	Review film permits, access database will be in EnerGov software	Various	Land Use Operations	Recommended	Automated
Fire Hydrants	Existing Database/Field Collection	Public Works	Water Distribution	Recommended	Annually

Data Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
Flood Plain Mapping	Via FEMA shape file	Public Works	Land Use Planning	Existing	As Needed
Flood Zones	Updated from FEMA	GIS Team	Land Use Planning	Existing	As Needed
Gated Neighborhoods	Tracked in a database then geo-enabled	Automated	Reference Data	Desired	Quarterly
General Plan Land Use	Digitized	Environmental Services	Land Use Planning	Existing	Quarterly
Graffiti	Field Collection	Public Works	Field Crew	Desired	As Needed
Hazardous Materials Locations	Tracked in a database then geo-enabled	GIS Team, Public Works records	Public Safety Planning	Desired	Automated
High Trash Areas	Field Collection	Public Works	Reference Data	Desired	As Needed
Historical Aerial Photography	Aerial Flyovers	GIS Team	Raster Data	Partial	Historical
Home Occupancy	Extracted from Environmental Services/Customer Services database	Automated	Land Use Operations	Recommended	Automated
Homeless Encampments	Tracked in a database then geo-enabled	Automated from DEMS Database	Reference Data	Desired	Automated

Data Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
Homeowners Association	Digitized	Environmental Services	Reference Data	Desired	Annually
Hydrology	Aerial Flyovers	GIS Team	Land Use Planning	Existing	Weekly
Infrastructure (Camera, Wireless Network Equipment) Location	On screen digitization and linked to any live feeds	GIS Team with IT Team	Infrastructure Operations	Desired	As Needed
Inspector Area	Digitized	Environmental Services	Land Use Operations	Existing	Quarterly
Irrigable Land	Digitize	Public Works	Field Crew	Desired	Annually
Known Septic Systems in the City	GPS collection in the field/ Public Works documents	Public Works	Sewer Stormwater	Recommended	As Needed
Land Use	Digitized	Environmental Services	Land Use Planning	Existing	Quarterly
Library Card Holders	Extract from database, cleanse and geocode from database	Community Services	Reference Data	Desired	Quarterly
Library Locations	Digitized	Community Services	Infrastructure Operations	Existing	As Needed
LiDAR	Collected from 3rd Party Sources in 2005 and 2016	Public Works	LiDAR	Existing	As Needed
Liquor Licenses / Bars	Geocoded	State of California and Business License Data	Land Use Operations	Recommended	Quarterly

Data Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
Massage Licenses	Extracted from database	Automated	Land Use Operations	Desired	Automated
Meals on Wheels Locations	Digitized	Community Services	Reference Data	Desired	As Needed
Meter Location	Digitize/GPS Identification	Public Works	Water Distribution	Desired	As Needed
Mutual Aid Areas	Scanned from police documents	Police in conjunction with GIS Team and County	Public Safety Planning	Desired	As Needed
Neighborhood Watch Districts	Digitized On Screen	Police Department in conjunction with GIS Team	Reference Data	Recommended	Annually
Neighborhoods	Digitized	Environmental Services	Reference Data	Existing	As Needed
Offenders on Parole	Extract, cleanse and automatically map from State and/or County Data.	Automated	Public Safety Planning	Recommended	Automated
Offenders on Probation	Extract, cleanse and automatically map from City, County, and/or State Data.	Automated	Public Safety Planning	Recommended	Automated
Parking Lots	Digitize	Public Works	Infrastructure Operations	Partial	Annually
Parking Permits & Citations	Integration with MUNIS database	Automated	Law Enforcement Operations	Recommended	Automated
Parking Violations	Extract, cleanse and automatically map from RMS.	Automated from Versadex	Law Enforcement Operations	Recommended	Automated

Data Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
Parks	Extract, cleanse and geocode from database	GIS Team	Facilities Streets	Existing	Annually
Past Permitting Information	Digitize and geocode from document management system	Environmental Services	Land Use Operations	Desired	Historical
Pavement Condition	Link with Street Saver Software	Public Works	Infrastructure Operations	Desired	Automated
Pavement Markings	GPS collection in the field and documentation	Public Works	Facilities Streets	Existing	Annually
Permits and Certificates of Occupancy	Extract, cleanse and geocode from database/spreadsheets.	Environmental Services - Automated	Land Use Operations	Recommended	Automated
Pet License Holders	Extract, cleanse and geocode from database	County Information	Reference Data	Desired	Automated
Plan Development Permits and Certificates of Occupancy	Extract, cleanse and geocode from database/spreadsheets.	Environmental Services- automated through EnerGov	Land Use Operations	Desired	Automated
Policing Beats and Response Zones	Digitize on screen	Police in conjunction with GIS Team	Law Enforcement Operations	Existing	As Needed
Pre Plan Data (Buildings)	Link Digital and Scanned Drawings	County Fire Department GIS Team	Land Use Operations	Recommended	Weekly

Data Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
Public Assistance Locations	Extract, cleanse and geocode from database/spreadsheets	Community Services	Reference Data	Desired	Annually
Public Utilities	Field collection, digitization, and as-builts	Public Works & Various Utilities	Infrastructure Operations	Existing	Weekly
Railroad Right of Way	Digitized on screen	Parcel data, Ventura County	Parcel Publishing	Desired	Annually
Recycle Bin Locations	Extract, cleanse and geocode from database	Community Services/Public Works	Reference Data	Desired	Quarterly
Rental Information	Extract from database, cleanse and geocode from database	Environmental Services	Land Use Operations	Desired	Quarterly
Residences by Occupancy	Extract, cleanse and geocode from database/spreadsheets.	Environmental Services-automated through EnerGov/document management program	Land Use Operations	Desired	As Needed
Right-of-Way	Digitize	Public Works	Parcel Publishing	Existing	Quarterly
School Crossing Guard Locations	Digitized	GIS Team	Administrative Area	Desired	As Needed
Schools	Digitize from base map data; GPS field work	Schools	Administrative Area	Existing	As Needed

Data Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
Service Requests from Hansen	Process can be automated using Data Mining tools	Public Works	Land Use Operations	Desired	Automated
Sex Offenders	From State	Automated	Law Enforcement Operations	Recommended	Automated
Shelters	Tracked in a database then geo-enabled	Emergency Services Records	Public Safety Planning	Desired	Annually
Short Term Dwelling Units	Extracted from database	Automated	Land Use Operations	Recommended	Automated
Sidewalks	GPS and digitizing from aerials	Public Works	Facilities Streets	Partial	Annually
Social Media	Automatically linked via software	Automated	Varies	Recommended	Automated
Special Needs Residents	Extract and map from Versadex CAD/RMS data.	Automated	Public Safety Planning	Recommended	As Needed
Specific Plan Areas	Digitized	Environmental Services	Land Use Planning	Partial	As Needed
Standing Plans	Tracked in a database then geo-enabled	Environmental Services- Automated	Land Use Planning	Desired	As Needed
Storm Water System	Digitize From As-Builts and other Source Documents	Public Works	Stormwater	Existing	Weekly

Data Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
Street and Traffic Signs	GPS collection in the field	Public Works	Facilities Streets	Partial	Annually
Street Lights	Digitized or provided by consultants	Public Works	Facilities Streets	Existing	Annually
Tax Payment Data	SAP Integration	Automated	Assessment Information	Recommended	Automated
Topography	Aerial Photography	GIS Team	Elevation	Desired	Annually
Traffic Accidents	Extract, cleanse, geocode, and map from database	Police	Law Enforcement Operations	Existing	Automated
Traffic Analysis Zones	Digitized	Public Works	Public Safety Planning	Partial	Annually
Traffic Data	Integrate from traffic count data	Public Works	Law Enforcement Operations	Partial	As Needed
Traffic Fiber, Signal Equipment, and Conduit	Digitized from Public Works Database/GPS Field Collection	Public Works	Infrastructure Operations	Desired	Quarterly
Transient Occupancies	SAP Integration	Automated	Reference Data	Desired	Automated
Trash Equipment	Field Collection	Public Works	Reference Data	Desired	As Needed

Data Layer	Creation Methodology	Recommended Update Division or Individual	Recommended Grouping	Existing or Recommended?	Recommended Update Frequency
Undeveloped Parcels	Extract, cleanse and geocode from database/spreadsheets	Environmental Services with Community Services	Land Use Planning	Desired	Quarterly
Utility Service Providers and Infrastructure	Digitization	Public Works	Infrastructure Operations	Desired	Quarterly
Ventura County Flood Control Areas	County Database	Community Services	Land Use Planning	Desired	Quarterly
Volunteering Locations	Tracked in a database then geo-enabled	Emergency Services Records	Reference Data	Desired	As Needed
Warrants	Extract, cleanse and automatically map from RMS.	Automated	Law Enforcement Operations	Recommended	Automated
Waste Water Collection System	Digitize From As-Builts and other Source Documents	Public Works	Sewer Stormwater	Existing	Weekly
Water Distribution System	Digitize From As-Builts and other Source Documents	Public Works	Water Distribution	Existing	Weekly
Work Orders	Process can be automated using Data Mining tools Geoenable from Hansen	Public Works	Land Use Operations	Desired	Automated
Zoning	Digitized on screen	Environmental Services	Land Use Planning	Existing	Quarterly

The following are the findings and recommendations from the Digital Data Assessment. The following base layers were reviewed in the ArcGIS ArcMap application and with the Esri Data Reviewer Extension. Items reviewed included:

- Horizontal alignment
- Spatial consistency
- Topology
    - Overlapping polygons
    - Polygons with gaps
    - Dangle nodes
    - Multipart polygons
    - Stacked polygons
- Valid/Invalid geometry

Base Layers

Parcels

For city governments, the acquisition and integration of an accurate and up-to-date parcel base map is arguably the critical centerpiece of a GIS effort. Tax parcels represent a core component layer for modeling land use within the City and provide a substantial basis for developing other base map layers.

Several immediate and long-lasting benefits normally derived from parcel base map layer integration include:

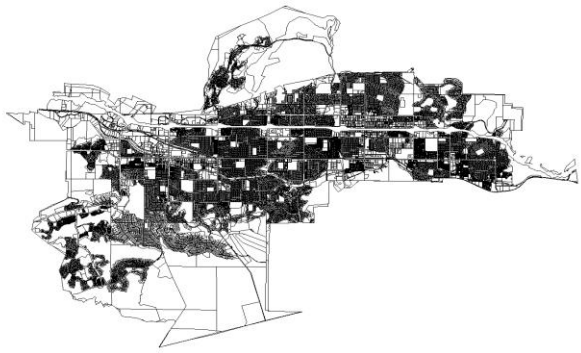
- A comprehensive inventory and accounting of all taxable land
- Comparisons of deeded and calculated (actual) acreage
- Inventory and determination of Government-owned lands and conveyances
- Verification of tax rolls and incorporation of city annexations, providing checks-and balances of appraisal entity records
- Provides a strong foundation for control of future growth, land development, and population forecasting
- Fosters closer cooperation with other local governmental entities

Among the more tangible and practical benefits emerging from the parcel base map layer:

- City mailing lists & affected property owner notifications
- Improved Police response and emergency evacuation
- Readily available property ownership information
- Property valuations and City service expansion/prioritization
- Floodway management & building code enforcement
- Creation of city map books and atlases

History

Parcels were originally digitized from paper maps and plats by FUGRO in the 1990s. The City wanted to work with Ventura County, to obtain parcels, but decided to take on the project themselves. Today, parcel lines are updated internally using source documents. A quarterly update from Ventura County of assessment data is linked to the parcels via a parcel identification number. When staff updates the Parcel layer, they follow the LGIM format.



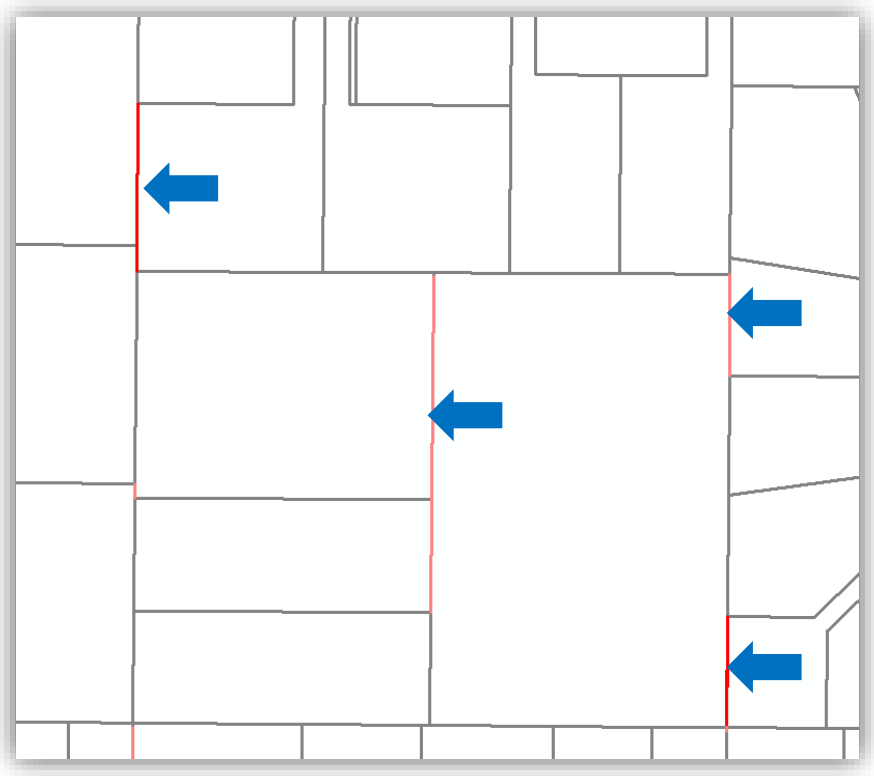
Simi Valley Tax Parcels

Parcel Geometry

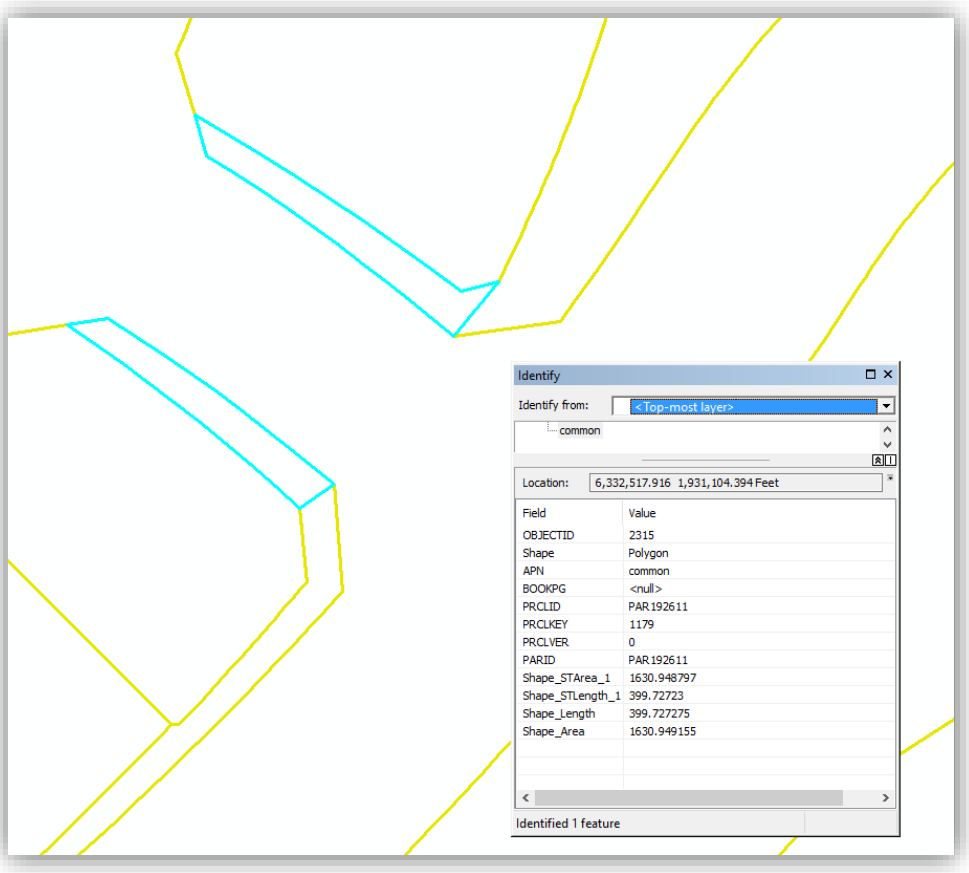
The parcel data provided by the City covered all of Ventura County. The data was clipped to a City boundary for this review. The parcels within the City consist of approximately 41,000 polygons and were first checked for geometry errors. The summarized results are as follows:

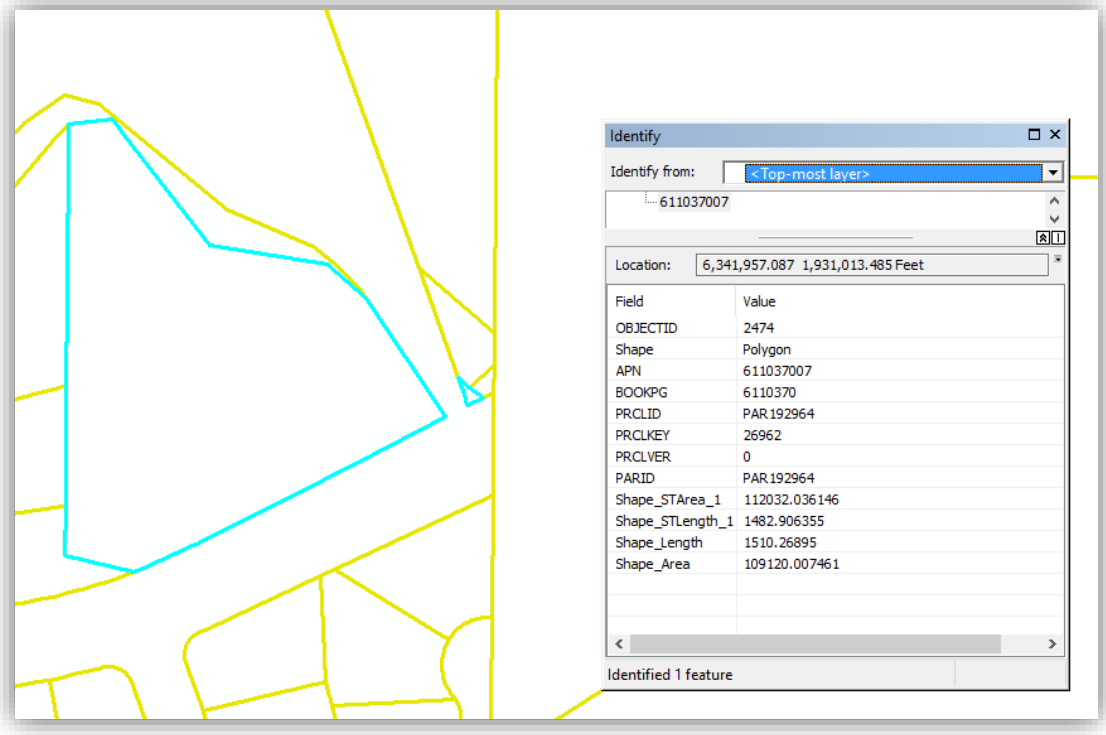
- Horizontal accuracy issues detected (parcel lines going through buildings, etc.)
    - Poor spatial alignment of property boundaries that need to be adjusted
- Topology build revealed numerous polygon "gaps" and "overlaps" that will need further review.
    - Gaps – these are voids between polygon boundaries
    - Overlaps – these are areas where adjacent polygons overlap
- ArcGIS Data Reviewer results:
    - No invalid geometries detected
    - Multipart polygons detected
        - These are polygons that are actually composed of multiple parts and are not contiguous
    - No unnecessary polygon boundaries detected

Parcels with Spatial Alignment Issues, parcel boundaries



Parcel Polygon Gaps & Overlaps





Multi-Part Parcel Polygons

Parcel Attribution

Parcel attributes were next reviewed for relevancy and completeness. The parcel data does include the following key attributes:

- APN – Parcel ID number
- BOOKPG – Book & Page number

The above key attributes were reviewed and determined to be complete with no missing data. Other data available from the Ventura County Assessor's CAMA system are joined to the parcel data using the parcel id as a common link.

Recommendations

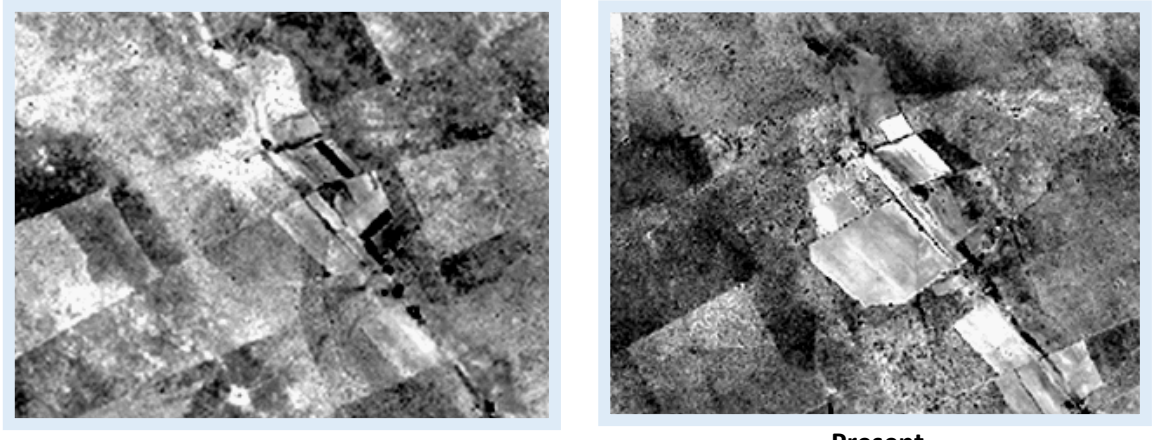
Based on the data assessment, following are the key recommendations for improving the parcel data layer:

- Perform a spatial adjustment of the parcel data using published control points and recent aerial photography to improve the horizontal accuracy of the data.
- Correct polygon gaps and overlaps.
- Correct any remaining topological errors.

Orthophotography

The City of Simi Valley currently has access to accurate, high resolution orthophotography through CIRGIS, the Channel Islands Regional GIS Collaborative. The City is a member of CIRGIS and contributes financially to the creation of aerials every two years. The latest aerial photography was obtained in 2015, with a resolution of 3 inches in the city and 6-inch resolution in the area surrounding Simi Valley. The City also has historical aerials from 2001, 03, 05, 07, 10, 13, and 15. CIRGIS is currently requesting bids from vendors to acquire new imagery and orthophotography for the 2017 data creation effort.

The regional CIRGIS shared cost model reduces the prices and allows the City to have high quality orthophotography. It is recommended that the City continue to utilize orthophotography to derive and generate new GIS data layers through heads-up digitizing. Many features on the earth's surface can be detected from the photography. This allows GIS Team to create and augment data layers in lieu of field work. In addition, it is recommended that the City perform change detection analysis, manually, using chronologically sequential digital orthophotographs. Change detection analysis can be used to assess and evaluate physical changes with regard to physical geography and land use.



Past **Present**

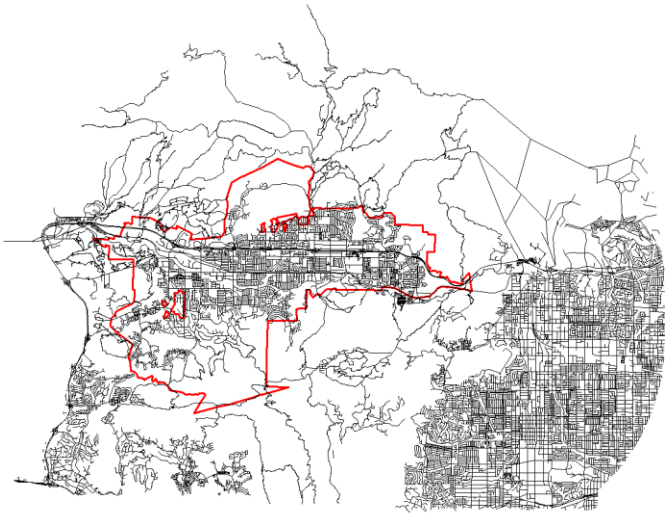
Example of change detection using sequential orthophotography

Street Centerlines

This dataset was created for base-mapping purposes, and to display streets. It was derived from aerial photography and originally acquired from the Fire Department. The data has been modified and enhanced by the City GIS Team. Its primary purpose is for address range information utilized for Police Dispatch in their CAD/RMS and for geocoding addresses/locations.

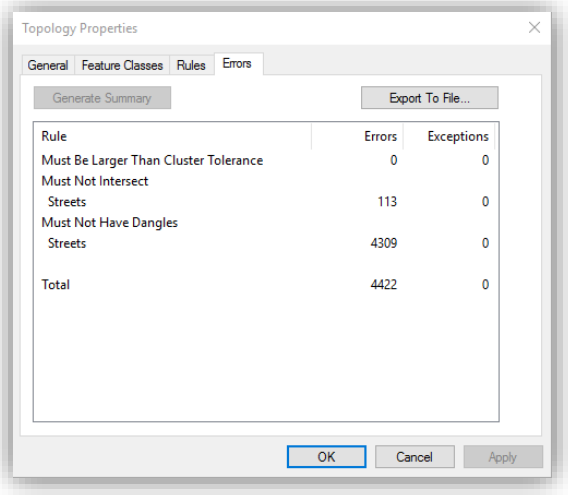
<u>Street Centerline Geometry</u>

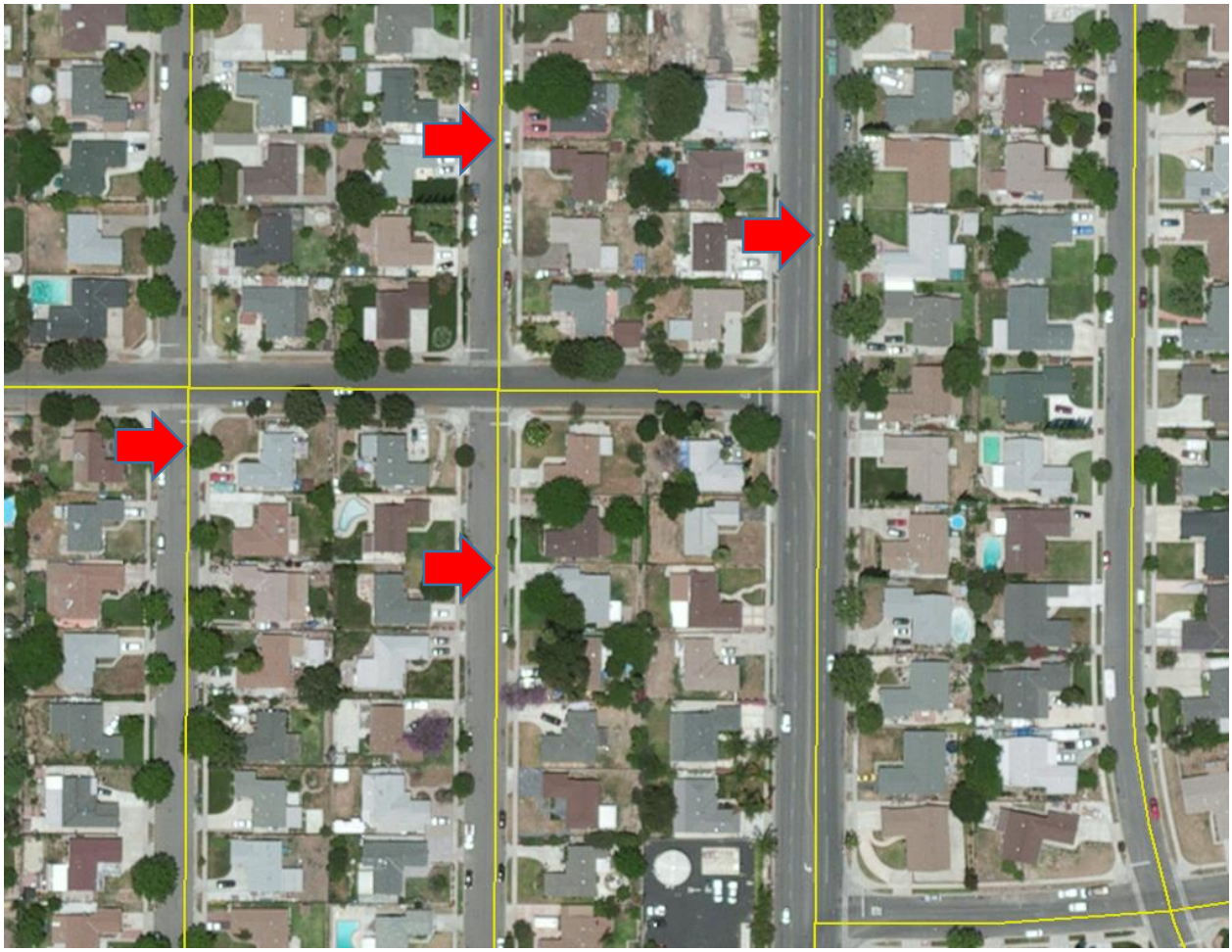
The street centerline data provided by the City for review consists of 6,969 street segments and was first checked for geometry errors. The summarized results are as follows:



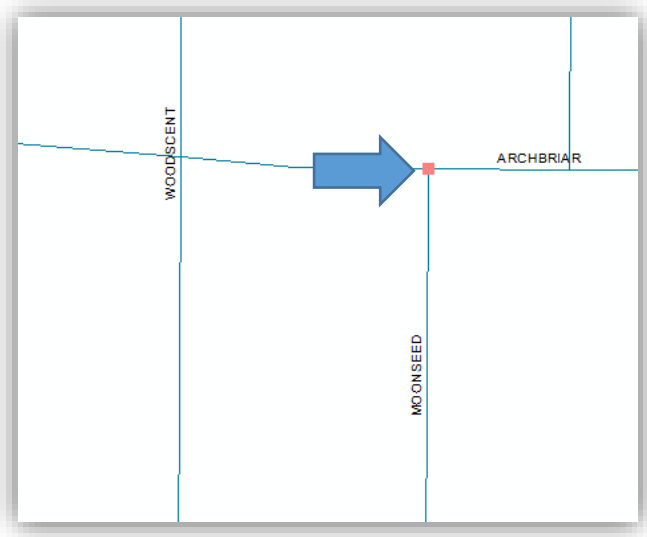
Simi Valley Street Centerlines

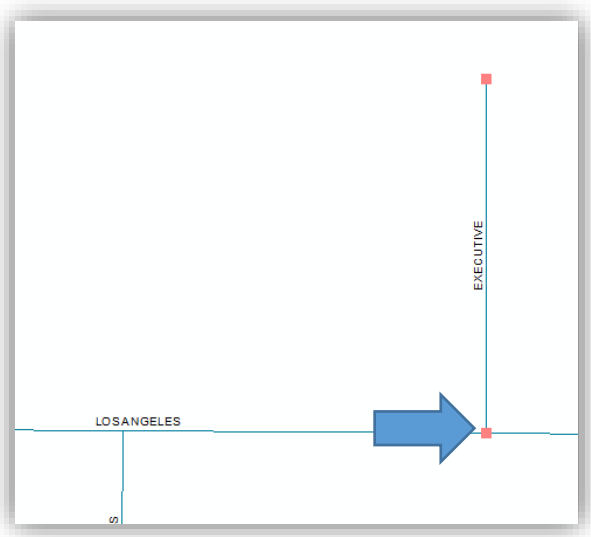
- Horizontal accuracy issues detected (some line work not in center of road)
- Streets are digitized in the proper direction based on address ranges
- The centerlines were created so that they are continuous from intersection to intersection. For example, the 100 block of Main St. should be a continuous line until it reaches the next intersection and becomes the 200 block.
- 9 street segments have a length less than 1 foot. These should be investigated as potential fragments.
- Topology was created and 113 intersections along with 4,309 dangle nodes were detected. Many of the dangle nodes are legitimate since they occur at the end of a street but some were actual errors
- ArcGIS Data Reviewer results:
    - 0 invalid geometries detected
    - 1 multipart line detected





Examples of horizontal alignment issues

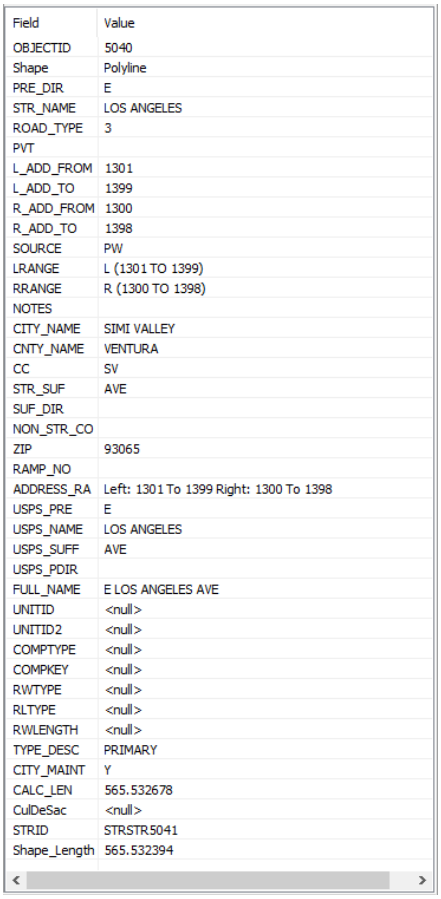




Examples of dangle node and intersection errors

Street Centerline Attributes

Street centerline attributes were reviewed and the following key attributes are present in the data:



Field	Value
OBJECTID	5040
Shape	Polyline
PRE_DIR	E
STR_NAME	LOS ANGELES
ROAD_TYPE	3
PVT	
L_ADD_FROM	1301
L_ADD_TO	1399
R_ADD_FROM	1300
R_ADD_TO	1398
SOURCE	PW
LRANGE	L (1301 TO 1399)
RRANGE	R (1300 TO 1398)
NOTES	
CITY_NAME	SIMI VALLEY
CNTY_NAME	VENTURA
CC	SV
STR_SUF	AVE
SUF_DIR	
NON_STR_CO	
ZIP	93065
RAMP_NO	
ADDRESS_RA	Left: 1301 To 1399 Right: 1300 To 1398
USPS_PRE	E
USPS_NAME	LOS ANGELES
USPS_SUFF	AVE
USPS_PDIR	
FULL_NAME	E LOS ANGELES AVE
UNITID	<null>
UNITID2	<null>
COMPTYPE	<null>
COMPKEY	<null>
RWTYPE	<null>
RLTYPE	<null>
RWLENGTH	<null>
TYPE_DESC	PRIMARY
CITY_MAINT	Y
CALC_LEN	565.532678
CulDeSac	<null>
STRID	STRSTR5041
Shape_Length	565.532394

- PRE_DIR – Street name prefix direction
- STR_NAME – Street name
- ROAD_TYPE – Street classification
- L_ADD_FROM – Street left from address number
- L_ADD_TO – Street left to address number
- STR_SUF – Street name suffix
- SUF_DIR – Street name suffix direction
- ZIP – ZIP code number

Based on the review of the above attributes, the following observations were made:

- Some streets do not have complete address ranges and their attributes should be updated
- A large number of the fields have not been populated with data
- Overall the data within City limits is in relatively good condition and is suitable for geocoding and routing functions

Recommendations

Overall the street centerline data layer appears to have been well designed initially, but will need additional editing to correct various horizontal accuracy issues and some other minor issues as noted. Based on the data assessment, the following are the recommendations for improving the street centerline data:

- Using current aerial photography, spatially adjust the streets to the true centerline of the roadway.
- Correct all dangle node and intersection errors.
- Correct any other topological errors identified.
- Review all the “less than 1 foot” street segments and determine if they should be merged.

- Review and edit all existing populated attributes to ensure completeness.
- Review all currently unused fields in the database, determine which ones would prove useful to the City, and populate them with data.
- Edit streets outside the City boundary that fall within a Public Safety zone (Police & Fire) to ensure they will be suitable for geocoding and routing function.

Address Points

The City currently possesses an address point layer. Accurate address layers are of the utmost importance. An organization is often faced with the challenge of accurately mapping the location of work orders, work requests, building permits, and outage calls throughout the city. If an accurate address point layer does not exist, unfavorable results will occur when trying to map code enforcement cases (Accela), track business licenses or utility billing (EnerGov), or incidents (Versadex) using an address. Lack of an accurate address point layer will often result in unmatched records. In these cases, the City of Simi Valley will need to invest additional time and resources attempting to determine the location of the records manually.

Simi Valley Address Points

The following are specific findings:

<u>Address Point Geometry</u>

- Address points occasionally placed at the center of the building, but not consistently.
- Multi-dwelling unit (MDU) structures are represented correctly with multiple address points representing separate units
- Address point data is not NENA compliant
- Data Reviewer:
    - 0 invalid geometries detected

Examples of Address Points not located on building correctly

Properly addressed Multi Dwelling Units

Address Point Attributes

Address point attributes were reviewed and the following key fields were identified in the data:

- STREET_DIR – Street direction
- STREET_NO – Building number
- STREET_NAM – Street name
- STREET_TYPE - Street type
- ALIAS_NAME – Street name alias
- FULL_NAME – full concatenated street address

Other fields exist but are not critical to geocoding functions.

Base on the review of the key attributes, the following observations were noted:

- All address points have an associated address number
- Other address attributes are correctly populated

Recommendations

Overall, the address point data appears to be complete with good attribution. Based on the data assessment, the following is recommended for improving the data:

- Address points should be placed at the center of the building they represent. The City should manually edit the address point data and place all address points at the center of the associated building.
- Especially for large multi-dwelling units, knowing the exact location of the address is of huge benefit to First Responders. The City should ensure that all MDU's are properly addressed.
- Remove extraneous data fields
- The address point data should be standardized to be NENA (National Emergency Number Association) compliant.

Active maintenance of the address point layer to maintain a high level of quality is recommended as is the prompt development of new address points as new addressable structures are created. The address layer itself is missing some necessary fields that are typical for a NENA compliant database and should be updated per the following table:

Recommended Address Data Components					
	Attribute Field Description	**Example Input**	**Field Type**	**Field Width**	**Field Name**
1	Primary Address Number	325	Numeric	5	HouseNum
2	House Number Suffix	½	String	4	HouseSuf
3	Prefix Directional	N	String	2	Prefix
4	Street Name	Main	String	35	Name
5	Street Type	St	String	4	Type
6	Suffix Directional	E	String	2	Suffix
7	Secondary Address Identifier	Apt	String	4	Unit
8	Secondary Address Range	12	String	4	UnitNum
9	City / Town	Columbia	String	25	City
10	State	SC	String	2	State
11	Zipcode	29201	Numeric	5	Zipcode
12	Plus Four code	1284	Numeric	4	Plus4
13	Mailing Address	PO Box 503	String	40	MailAdd
14	Mailing Community	Lexington	String	25	MailCity
15	Mailing State	SC	String	2	MailState
16	Mailing Zipcode	29027	Numeric	5	MailZip
17	Mailing Plus Four Code	1867	Numeric	4	MailPlus4
18	Rural Route	234	String	25	Reside
19	Data Entry / Modify	3-6-2012	String	10	Date

Public Works Data

The City of Simi Valley maintains data for water, sanitary sewer, and stormwater systems. These data are classified as secondary base layers and can provide valuable layers of information to GIS mapping systems as well as support asset management needs and various engineering analysis needs.

Water System

The water system contains various features representing pipes, valves, and hydrants. Pipes include attributes for diameter, material type, and lifecycle status. Valves include attributes for valve type, diameter, and lifecycle status. Fire hydrants include attributes for hydrant ID and for lifecycle status. Topology was built for the pressurized mains data and it appears to have very good connectivity with few or no errors.

Water Distribution and Hydrant Data

The water system does contain a geometric network which helps to maintain the integrity of the connected network and allows for the following capabilities:

- Calculate the shortest path between two points
- Find all connected or disconnected network elements
- Determine flow direction of edges when sources or sinks are set
- Trace network elements upstream or downstream from a point
- Calculate the shortest path upstream from one point to another
- Find all network elements upstream from a point

Overall the water network appears to be well populated with data and attributes and is well connected making it suitable for various types of analysis and for hydraulic modeling.

Wastewater System

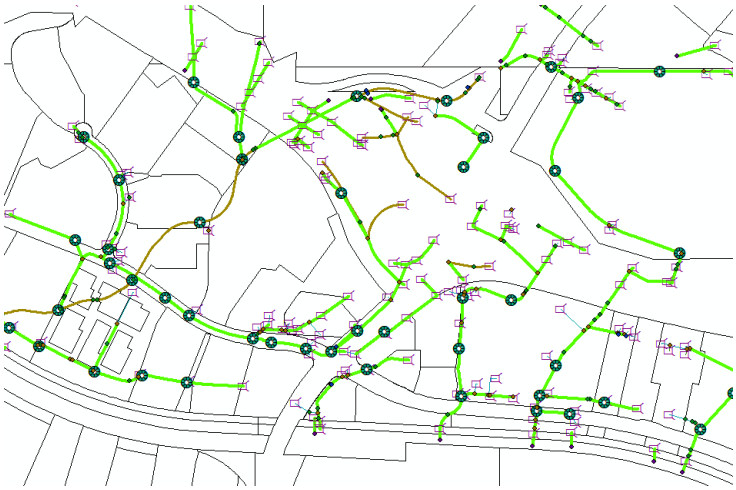
A fairly complete wastewater system exists in GIS with various data including pipes, valves, manholes, lift stations, and service lines. Pipes contain a fair amount of attribution including diameter, material, end point elevation, slope, connected manholes, etc. The included elevation and slope data are useful for modeling the wastewater network. Manholes contain significant attribute data including attributes for invert and rim elevation. Again, very useful information for modeling purposes with a product like Bentley SewerGEMS.

Waste Water GIS Layer

Topology was built for both the gravity mains and no connectivity errors were identified. The sewer network also has a geometric network built that provides the previously mentioned capabilities.

Stormwater System

The stormwater data is a well-designed and comprehensive representation of the City's drainage network. Gravity mains, manholes, inlets, lateral lines, and drainage channels are all well represented. Pipes contain attributes for material, diameter, length, and invert elevations. Manholes contain substantial attribution including access diameter, inverts, install date, owner, and lifecycle status. As with the other utility networks, stormwater has a geometric network with good connectivity established.



Simi Valley's Storm Water System

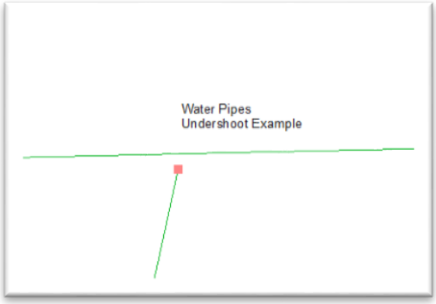
Utilities Recommendations

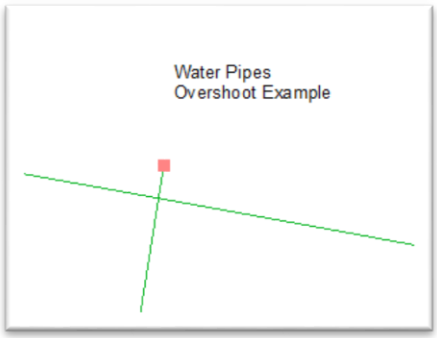
Overall the GIS data for the utility systems contains a significant amount of useful data and it is recommended that this data be improved in GIS to make this data more useful to a greater number of users and applications. Following are the general steps recommended to update and improve the existing utility data:

- Continue to logically organize the City's geodatabase around the LGIM model
- Migrate the utility data to the geodatabase
- Build topology and establish connectivity within the utility networks
- Identify missing features and fill in the gaps and correct errors
    - Review other source documents (as-builts, engineering, etc.)
    - GPS field data collection
- Develop a Geometric network to support modeling functions and enforce connectivity rules
- Develop a data maintenance plan

Various benefits will be seen once the utility data has been updated in GIS. These benefits include:

- Improvements to asset management
    - Tracking, locating, and managing
    - Standardization of:
        - Purchasing processes
        - Maintenance procedures
        - Equipment tracking
        - Inventory stores
- Integration of GIS with Hydraulic Modeling Tools
    - Demand projections
    - Fire flow assessments
    - Water quality simulations
    - Pump scheduling
    - Emergency planning
- Access and update data in the field
    - Improve workforce operations, productivity, and customer service
- Improvements to planning and engineering analyses
- Provide current and accurate information to Finance, Administration, and Customer Care Departments





Spatial Accuracy

The majority of layers analyzed throughout the QA/QC process carried out for this data assessment were supported primarily by high levels of spatial accuracy. The importance of this cannot be understated, as the effectiveness and resulting accuracy of all geographic processes and analyses is rooted in the initial spatial accuracy of these layers. As referenced in the Auxiliary Data Layers matrix, there are certain layers that can be improved upon in this category. Heads-up digitizing, GPS data collection and verification, and receiving updated data from external sources are potential methods for spatially rectifying layers that have been tabbed as lacking in this department.

ArcGIS Data Reviewer – Geometric Accuracy

Geometric accuracy is critical when working with GIS layers to ensure vector layers (points, lines, and polygons) are error-free, efficient, and accurately portray the intended real-world phenomenon. The ArcGIS Data Reviewer can be used to gauge the current status of feature geometries, topologies, and relationships between the two. Through the provision of numerous data checks specific to vector data type, and also the ability to batch check layers, this ArcGIS extension supplies the means to analyze current layer status and monitor layer health and integrity moving forward.

The nature of potential errors is variable between feature classes, and certainly between data types (i.e. points, lines, polygons, etc.), but are typically characterized by general invalid geometries, the presence of dangle nodes, and duplicate vertices. To maintain efficient workflows, data integrity, and the inclusion of geometric networks it is highly suggested that these type of incidents be remedied, and the ArcGIS Data Reviewer delivers in this regard as well.

After the ArcGIS Data Reviewer identifies instances of geometric error, these incidents are then written to layer-specific reviewer tables for review and correction. These customizable and interactive tables give the framework for breaking down the error(s) by severity, check type, status of review, and last editor. In this scenario checks are performed manually through this extension, then updates are made and tracked through the reviewer tables. However, the ArcGIS Data Reviewer also has options for configuring routine automated checks for data layers that are prone to change and frequented by editors.

Attribution

Attribution within GIS data layers is crucial to providing supplemental information regarding layer features. This data is often used for querying, analysis, and maintaining assets and workflows. All

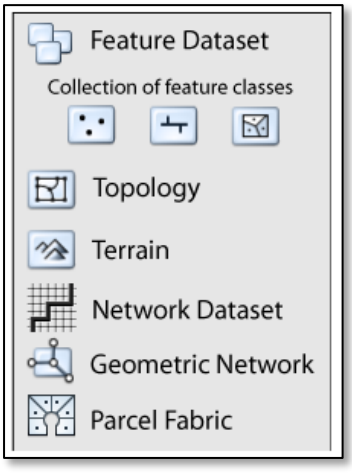
necessary fields within functional data layers should be completely populated to avoid misinterpreted data, skewed queries, and inefficiencies when working with the data. During this digital data assessment, the attribute completeness of the key data layers was reviewed manually to provide an accurate view of the current state. The first step to correcting attribute incompleteness is to identify necessary, critical fields for each layer, as several layers contain unused fields or duplications. Certainly the accuracy should be improved upon with attribute rectification tagged as a priority moving forward.

Database Design

Proper design of the enterprise GIS database is critical to effectively support organization data needs, applications, data maintenance and update, data security, etc. The City currently maintains GIS data in the MSSQL Express environment and some of the data layers are stored in feature datasets which allows for better data organization and allows for the creation of topology and geometric networks. There are still a large number of layers being stored as standalone shapefiles or geodatabases on the "S Drive."

It is recommended that all key standalone feature classes be placed in feature datasets within the central database. A feature dataset is a collection of related feature classes that share a common coordinate system. Feature datasets are used to spatially or thematically integrate related feature classes. Their primary purpose is for organizing related feature classes into a common dataset for building:

- a topology,
- a network dataset,
- a terrain dataset,
- a geometric network,
- a parcel fabric.



Additionally, feature datasets can be used to:

- Organize thematically related feature classes,
- Organize data access based on database privileges,
- Organize features classes for data sharing.

The City's geodatabase does follow the LGIM model. The City's geodatabase was migrated by consultant Vertex3 in 2013. The LGIM contains a variety of logically defined feature datasets and feature classes that are common to most local government's spatial data needs. A data layer has the potential of being

logically assigned to more than one feature dataset; for example, TIGER roadways from the Census Bureau could be potentially assigned to either the 'Facilities Streets' dataset or to the 'Demography' dataset. It would also be possible to classify a bicycle trail in either the 'Facilities Streets' dataset or the 'Administrative Area' dataset. However, GIS layers that are created and formatted to the LGIM should be matched as closely as possible to the representative feature class in the LGIM design (LGIM metadata is useful in making this determination). This is especially important when using the LGIM in conjunction with ArcGIS for Local Government.

The LGIM connects silos of information in an organization and integrates processes across typical government departments. It helps provide for more effective operations, better communication, saves time and money, and engages citizens in more meaningful ways. In addition, it also supports data sharing between local governments and regional, state, and federal agencies.

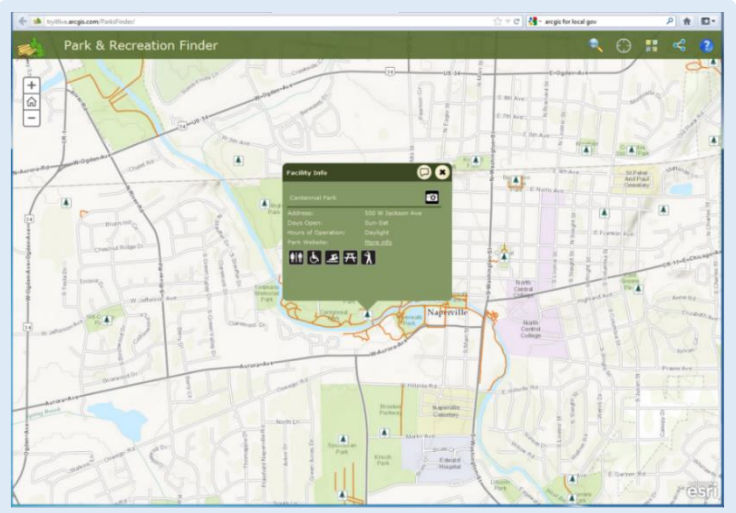
Following are the feature datasets defined by the LGIM:

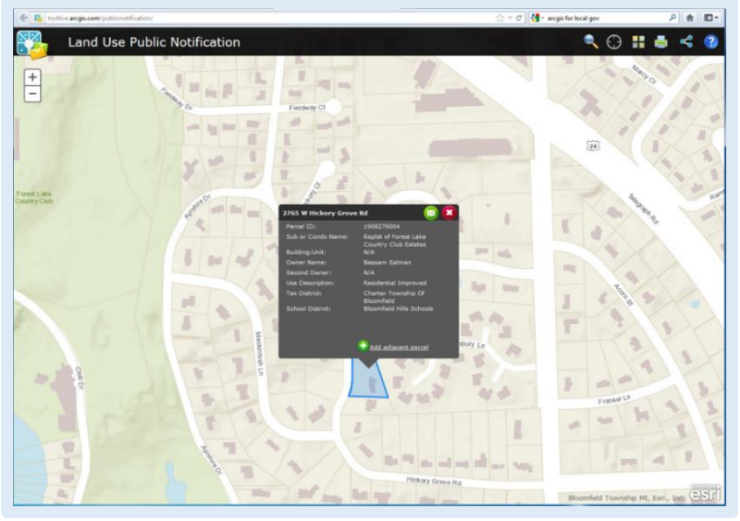
- Address
- Administrative Area
- Assessment Information
- Cadastral Reference
- Capital Planning
- Citizen Service
- Demography
- Election Administration
- Election Results
- Elevation
- Emergency Operations
- Facilities Streets
- Field Crew
- Infrastructure Operations
- Land Use Operations
- Land Use Planning
- Parcel Editing
- Parcel Publishing
- Raster Data
- Public Safety Planning
- Reference Data
- Sewer Stormwater
- Stormwater
- Water Distribution

ArcGIS for Local Government

ArcGIS for Local Government (AG4LG) is the name of an initiative and resource that allows cities, counties and other local agencies – of any size – to rapidly deploy and exploit GIS technologies in support of their daily government activities. AG4LG contains a set of predefined GIS schema (the LGIM), data dictionaries, base maps and applications (desktop, mobile and web), all built on a common data model and designed

to work together, among and between departments and agencies, and across an assortment of platforms. In addition to the deployment efficiencies, the ArcGIS for Local Government maps, applications and information model are available *at no cost* to ArcGIS users.





The key to AG4LG's efficiency is its central information model. The LGIM supports a series of foundation layers and enterprise information tables which support streamlining government operations, encouraging efficient communications and collaboration. The centralized and standardized data model design fosters rapid deployment, business process integration, and data sharing. Esri has evolved its corporate strategy to embrace both AG4LG and ArcGIS OnLine (AGOL). Therefore, there will be a continued trend towards adoption within local government and an expanding base of available applications and inherent functions.

Conclusion

Existing GIS data at Simi Valley is an important and valuable City asset. These data layers can assist all City departments in decision making, asset tracking, visualization, analysis, and various other functions. This project has identified the need for a number of additional layers and improvements to many existing layers. It will be important that the City budget for the creation of some of the missing data layers and for the completion/update of other enterprise-wide layers. The 2013 migration to the LGIM model will be beneficial once the City incorporates some of the ArcGIS for Local Government tools.

GIS SOFTWARE SOLUTIONS

CITY OF SIMI VALLEY

CALIFORNIA

GIS ASSESSMENT AND REVITALIZATION PLAN

SECTION OUTLINE

The following section summarizes the existing GIS software conditions based on the Needs Assessment interviews and analysis of existing GIS. Software is often how the merits of GIS are judged. Organizations can have great data but without appropriate software, GIS success is limited. Historically, GIS software has not been user friendly, thus limiting its effectiveness. However, that has changed over the past few years as GIS companies have spent billions of dollars on the user experience. However, many local government GIS implementations have yet to embrace and/or implement this next generation GIS experience. There are many reasons why, some of which are as follows:

- Lack of proper staffing – not enough staff to implement the new tools
- Lack of education – not enough time to educate the organization about the new tools
- Tradition – GIS staff have implemented the last generation toolset and have invested themselves in making the tools work. In some cases, they have a hard time parting with what they tools they have created.
- Software vendors – every organization has a plethora of IT systems. Every system purports to have the best GIS tools. However, in many cases they are generations old and do not leverage the new user-friendly tools.
- Burnout – end users have been fed poor GIS tools for decades. Often, they are reticent to try the latest and greatest since they have had bad experiences in the past.
- Cost – in some cases the new tools require new backend systems. A good example of this is the modern CMMS/Work Order systems have great GIS tools. However, the cost of implementation may be too onerous forcing organizations to struggle along with a poor system.

The following table identifies some of the core software findings for the City

City of Simi Valley Software Findings
No enterprise geo-database toolset – the City needs to upgrade from ArcGIS for Server Workgroup to ArcGIS for Server Enterprise
Need a better more robust intranet toolset – Esri WebApp Builder
Limited public access – huge opportunity to use Esri tools like Story Maps to tell the City's story.
Need packaged solutions for departments – using Esri toolsets, various products can be used to give departments a variety of levels of solutions
Lack of mobile GIS – the use of the Esri Collector and other mobile tools is a must
Lack of automated database extracts – leveraging the wealth of data in various IT systems

1
INTRODUCTION

THE VISION

Make GIS Software Accessible throughout the Organization, and to the Public and other interested parties

THE GOAL

Deploy a full suite of Esri GIS software solutions across the enterprise – Desktop, Internet, Intranet, and Mobile.

Task #1: UPGRADE ESRI LICENSING – The City must implement ArcGIS for Server Enterprise and centralize all data on a geodatabase.

Task #2: INTRANET SOLUTION – Deploy a state of the art Intranet using the existing Esri licensing (Esri Web AppBuilder).

Task #3: ARCGIS ONLINE (AGOL) SOFTWARE INITIATIVE – Plan, design, and deploy AGOL, including the setup, configuration, and effective use of the tools and applications available.

Task #4: STORY MAPS – Develop a sequence of City wide story maps using a five step process including 1. Storyboarding, 2. Data Gathering, 3. Design, 4. Build and Refine, and 5. Publish and Maintain.

Task #5: INTERNET PUBLIC ACCESS PORTAL – Use the AGOL solution to deploy a state of the art solution for the public.

Task #6: CROWDSOURCING – Engage and solicit input from citizens by promoting crowdsourcing applications. Utilize a reliable database to house information gathered from the crowdsourcing application.

Task #7: PACKAGED SOLUTIONS – Esri tools should be leveraged to implement targeted internal toolsets for each department.

Task #8: MODELING EXTENSIONS – The City should take advantage of Esri's modeling extensions for the desktop.

Task #9: MOBILE SOFTWARE SOLUTIONS – Plan, design, and deploy Esri's ArcGIS Online as the mobile software solution.

Task #10: AUTOMATE DATABASE EXTRACTS-- Using an off-the-shelf tool, data from every IT system should be automatically geo-enabled.

2

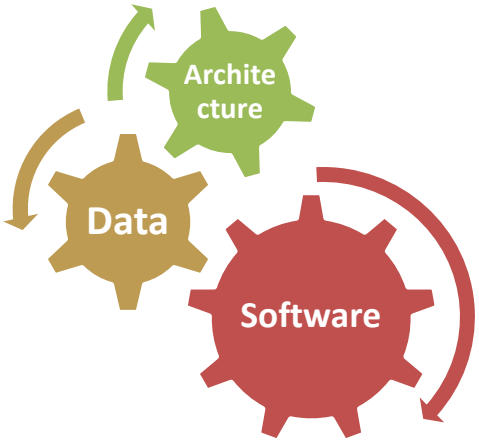
GIS SOFTWARE

DEPLOYING ENTERPRISE GIS SOLUTIONS

Local governments no longer need a sales pitch on the benefits of enterprise GIS. Overwhelmingly, government agencies at all levels continue to invest in GIS. Typically, the goal for most of these implementations involves enabling the entire organization to utilize GIS for various purposes. However, very few enterprise GIS implementation projects complete successfully. The causes of failure are numerous and varying, but they are generally related to a misunderstanding of the different components of GIS and the interrelationship between system architecture, data, and software. When these areas are understood in their proper context and relationship, organizations can plan for cost, resources, integration, priorities, time, and outcomes. Then organizations can successfully invest in GIS to provide their users with an intuitive tool that meets their unique needs. Once accomplished, the organization will achieve the objectives of GIS by maximizing the efficiency of decision making and planning, providing efficient means for data distribution and handling, eradication of duplicate data, integration of information from many sources, analysis of queries involving geographical reference data for generation of new information, and update data quickly while minimizing cost.

Components of GIS

While the focus of this chapter is primarily related to GIS software solutions, the other components of GIS require a brief explanation since each component relies and is interrelated to the others. Like a series of gears, no one component can stand alone to create a successful GIS implementation. Therefore, no one component is more important than another; hence, software cannot be deployed in a vacuum. For example, an organization can have enormous amounts of highly accurate and current data, but without the skill of people or the software to analyze, the data is worthless. The following briefly describes the different components of GIS.



People

People make GIS work. They may include positions/roles like GIS managers, database administrators, application specialists, systems analysts, and programmers. They are responsible for the maintenance of the geographic database and provide technical support. People are also the subject matter experts within the various departments that perform GIS queries, create maps, collect and update data, and make decisions from the GIS analysis. People associated with a GIS can be categorized into: viewers, general users, and GIS specialists. GIS continues to permeate all levels of organizations from executives to field operation personnel.

Procedures

Procedures include defining the retrieval, input, storage, management, transformation, analysis and final presentation output of data. Procedures also include the steps taken in answering question needing resolution. The ability of a GIS to perform spatial analysis and answer these questions is what differentiates this type of system from any other information system.

Hardware

Hardware consists of the technical equipment needed to run a GIS including computers with enough processing power to run the software, enough memory to store large amounts of data, and input and output devices such as scanners, tablets, digitizers, GPS data collectors, and printers.

Software

There are many different GIS software packages available today. All packages must be capable of data input, storage, management, transformation, analysis, and output; however, the appearance, methods, resources, and ease of use of the various systems differ. Today, organizations must also consider software for an ever increasing mobile workforce and consumer base. In addition, software includes applications that allow for interfacing and integrating between systems. In recent years web services like SOAP and REST have greatly expanded the reach of GIS software and allowed for integrating GIS with a large spectrum of other business systems.

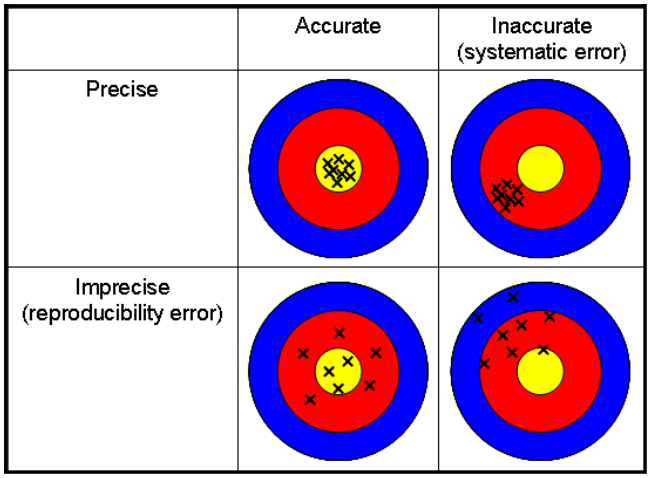
Data

Generally speaking, the most expensive and time consuming aspect of initiating a GIS involves the collection and creation of data. Several things require consideration before acquiring geographic data. Data quality is vitally important and requires verification before obtaining any data. Errors in the data set will most likely add countless unpleasant and costly hours to implementing a GIS. Furthermore, the results and conclusions of the GIS analysis will propagate the errors and result in bad solutions. Several guidelines to look at include:

- **Lineage** – provides a description of the source material from which the data originates. Lineage should include dates of the source material and all updates and changes made.
- **Positional Accuracy and Precision** – *Accuracy* refers to how close a measured value is to the true or accepted value. For example, if an object known to be 5ft. in length was measured with a reading of 5.5ft., the measurement would be considered inaccurate.

  Precision refers more to repeatability. In other words, how close a group of measurements are to each other. For example, if the same 5ft. object were measured five (5) times with results of 5.5, 5.6, 5.4, 5.58, 5.35, the measurements are considered precise (however, not accurate).

  The diagram at right illustrates the differences between accurate and precise. In order to have confidence in spatial data, results need both accuracy and precision.



- **Attribute Accuracy** – An attribute provides detail about some location, set of locations, or features. Often, this information includes measureable data like size, population, height, age or elevation. It may also include more descriptive information like a place name, owner, or address. For GIS analysis, reporting, and mapping purposes, accuracy of these details is vitally important.
- **Completeness** – Frequently, GIS features and attribute data omit relevant details. Typically, this is caused by incomplete source data and/or deficient data maintenance processes. Incomplete data can involve completely missing features such as building, streets, and assets. It may also include missing attributes needed for analysis. Performing checks and implementing robust maintenance processes help to provide complete data.

Network

The network pertains to the connectedness of the different hardware and software. Networks vary in capacity, scope, and speed. Networks allow for rapid communication and data sharing. They can include scopes of Local Area, Wide Area, and the internet. In essence, the network comprises the "backbone" infrastructure that allows a multitude of hardware and software to communicate.

As the above summary indicates, each component of GIS is vital. Therefore, when considering the selection and deployment of GIS software, Simi Valley must consider all the different components. For example, selection criteria must consider questions like:

People

1. Who are the users?
2. What is their experience with GIS tools?
3. How will the software being evaluated assist them in their daily work?
4. How will our users access the software (office, field, and Internet)?

Procedures

1. What workflows will need to be modified?
2. Which workflows/business processes will be streamlined?
3. How does the software manage change?
4. Does the output of the software provide useful information?

Hardware

1. What are the specifications of the hardware needs?
2. Will we have to acquire new hardware or can we use existing?

Data

1. Does the software make full use of our current data?
2. What data will we need to acquire or update to utilize this software effectively?
3. Does the software assist in managing our data?

Network

1. Is our network sufficient to handle the load of the software?
2. What network protocols are required?
3. Are there security issues that require consideration?

Of course this is not an exhaustive list of questions that need consideration, but simply illustrates that when planning for the selection and deployment of GIS software, Simi Valley needs a process to follow. The process shouldn't be overly complicated, but needs to consider the relationships between the different GIS components to help ensure a successful project.

3
EXISTING APPLICATIONS

Simi Valley has invested in several GIS specific and peripheral applications. Those applications include (bold items are GIS specific):

- **ArcGIS for Desktop Advanced (4)**
- **ArcGIS for Desktop Basic (24)**
- **ArcGIS Spatial Analyst (2)**
- **ArcGIS 3D Analyst (2)**
- **ArcGIS Network Analyst**
- **ArcPad (6)**
- **ArcGIS for Server Workgroup Standard (4 Cores)**
- **ArcPad (2)**
- **Google Earth**
- **Google Maps**
- **PhotoMapper**
- **Co-star**
- **CrimeView**
- **CrimeView Community**
- **Nextbus**
- **Versaterm**
- **Versadex**
- **ArborPro**
- **GraniteXP**
- **Spatial Wave**
- Facility Dude
- AutoCAD and Civil 3D
- CALOPPS
- Street Saver
- Infor Hansen
- Microsoft Office
- Tyler MUNIS
- Trapeze
- Polaris
- Chameleon
- Government Outreach
- Adobe Suite
- Accela
- SAP
- ESLOGS
- Symantec
- VC Alert
- EMOPS
- Nixle

The following section summarizes the major existing GIS applications within Simi Valley and evaluates their impact on the enterprise GIS efforts.

ArcGIS Products

The various components of ArcGIS and their interrelationships are outlined in the System Architecture Chapter and provides details related to licensing levels, architecture, and servers. For the Software Chapter, the focus is on specific applications and their relationship to enterprise GIS.

Simi Valley houses their core GIS data within Esri's ArcSDE utilizing Microsoft SQL Express as its relational database. Simi Valley has also selected Esri software for their GIS desktop solution. Staff does use PhotoMapper for some of their desktop functions. Esri licensing is under one customer number and are all managed centrally. This simplifies license management and ensures that Simi Valley is getting the most use out of their GIS software. For instance, a user in a specific department may utilize an Esri license on a given day. Once the user is done using that license, it is moved back to the central pool of GIS licenses, then it becomes available to all users. In effect, this allows Simi Valley to maintain fewer copies of the software as the software is available in a pool on an as needed basis. Simi Valley has the following Esri licensing available in its centralized software pool:

Product	Product Type	License	Total Authorization
ArcGIS for Desktop Advanced	Core	Concurrent Use	4
ArcGIS for Desktop Basic (ArcView)	Core	Concurrent Use	6
ArcGIS Pro	Core	Single Use	19
ArcGIS Spatial Analyst for Desktop	Extension	Concurrent Use	2
ArcGIS 3D Analyst for Desktop	Extension	Concurrent Use	2
ArcGIS Engine	Extension	Server	7
ArcGIS for Server Workgroup Standard (4 Cores)	Core	Server	3
ArcGIS for Server Enterprise Basic (4 Cores)	Core	Server	2
ArcPad	Extension	Single Use	2

It is recommended that Simi Valley migrate away from an ArcGIS for Desktop heavy system. ArcGIS Online tools, specifically the Esri Web AppBuilder, could be used as the primary portal for a majority of staff to access GIS. This will most likely decrease the need for ArcGIS for Desktop. Simi Valley currently has 19 ArcGIS Pro licenses, but due to the system requirements of ArcGIS Pro, the City will need to update its geodatabase version from 10.2.2 to 10.3 in order to utilize ArcGIS Pro software. Based on the Needs Assessment's, there will be 4 Tier 1 GIS users. These users will need access to ArcGIS for Desktop Advanced or Standard. Additionally, there are 11 people that will be considered Tier 2 GIS users and will need access to ArcGIS for Desktop Basic. The current availability of ArcGIS for Desktop Advanced and Standard licenses well exceed the recommendations made in this strategic plan. Therefore, it is recommended that Simi Valley consider reducing the license pool as intranet tools become more readily available. The move to ArcGIS Online will eliminate the need for some of the other licenses Simi Valley currently has such as ArcGIS Engine.

The GIS Needs Assessment projects a total of 327 Tier 3 GIS users. Not all of these staff will need a named ArcGIS Online account, but as the user base grows, the City should evaluate upgrading the ArcGIS Online plan further. The intranet portals should be configured so that City staff do not need to use a login. Additionally, the City should phase out the use and maintenance of ArcPad and use the Collector application instead. Users using the Collector application will need to be named users. By following these recommendations, Simi Valley would have the following ArcGIS software portfolio:

Product	Product Type	License	Total Authorization
ArcGIS for Desktop Advanced	Core	Concurrent Use	4
ArcGIS for Desktop Basic (ArcView)	Core	Single Use	11
ArcGIS Spatial Analyst for Desktop	Extension	Concurrent Use	1
ArcGIS Network Analyst for Desktop	Extension	Concurrent Use	2
ArcGIS 3D Analyst for Desktop	Extension	Concurrent Use	1
ArcGIS for Server Enterprise Standard (8 Cores)	Core	Server	3
ArcGIS for Server Enterprise Basic (4 Cores)	Core	Server	2
ArcGIS Business Analyst Online	Extension	Server	2
ArcGIS Online	Core	ArcGIS Online	27 Users – 2700 Credits

The GIS Coordinator (and future team members) in Public Works has to be very cognizant of license availability and make sure that the departments who are accessing GIS software do not experience times when software licensing is not available. Therefore, software usage has to be monitored to ensure that ample software is available. If software usage is high for a particular software product then additional seats should be acquired. Conversely, if software usage is low for a product then eliminating seats should be considered. This optimization could save the City many thousands of dollars over time.

GIS Viewer Applications

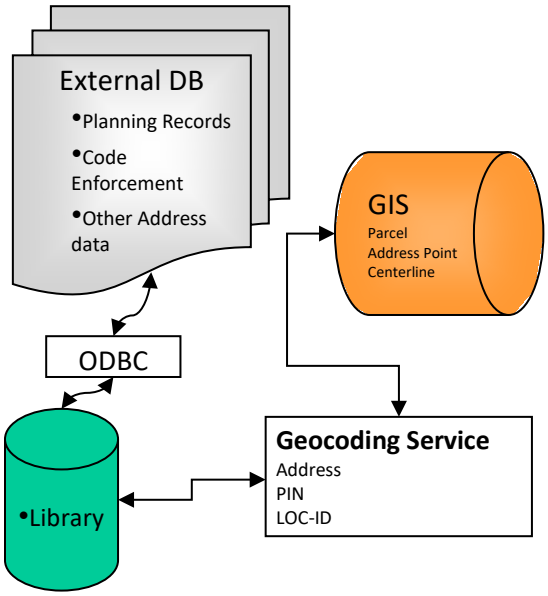
The Simi Valley Departments that have access to GIS information outside of GIS Desktop Applications utilize a variety of software. Some software utilizes its own mapping system through Esri such as Infor Hansen Work Order Solution and EnerGov. While these applications provide GIS mapping for the information stored in those databases, staff needs access to other intra and inter-departmental information. An Enterprise-wide GIS Intranet browser will allow City staff access to all of the City's GIS data across departmental boundaries. A public facing browser would allow residents access to selected information as well.

4
SOFTWARE SOLUTIONS

There are many different GIS software solutions and methods for implementation of GIS. Based on the needs assessments, similar needs and a desire to share information were requested throughout the City. The ideal solution for Simi Valley would be to continue the development of an Enterprise GIS and expand the usage of GIS technology. An Enterprise GIS integrates an entire organization so that users can maintain, share and utilize spatial data for various needs to address data development, modification and analysis. This would provide the City the ability to share information within the organization and with the public

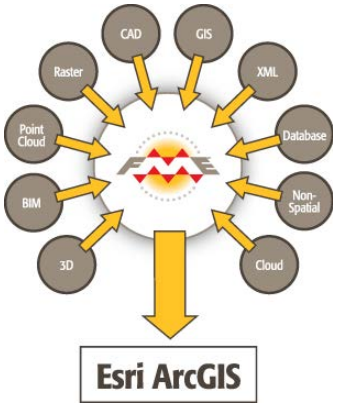
effectively. The similar needs for integration of non-spatial data (Access, Excel, hardcopy records, etc.), development of an intranet application, the creation of internet applications, and the desire to deploy mobile solutions can be addressed with an Enterprise GIS. The following provides details related to these GIS needs.

Data Mining / Geo-Enablement



Integration with non-spatial data is one component of creating an Enterprise GIS and a need expressed by several departments within the City. Data mining can be used to extract data from existing databases by geo-coding addresses or mapping coordinates and placing the results into a relational database (Oracle or SQL). The extracted data can then be stored and managed within the database. The resulting tables can be made available for IT professionals and analyzed using application software. The analyzed data can then be presented in a useful format such as a graph or table. An Enterprise GIS system should then be used as a front end to the analyzed data and relationships can be determined to link the analyzed data spatially. The graphic at left demonstrates, in a generic sense, the process of using data mining middleware to extract data.

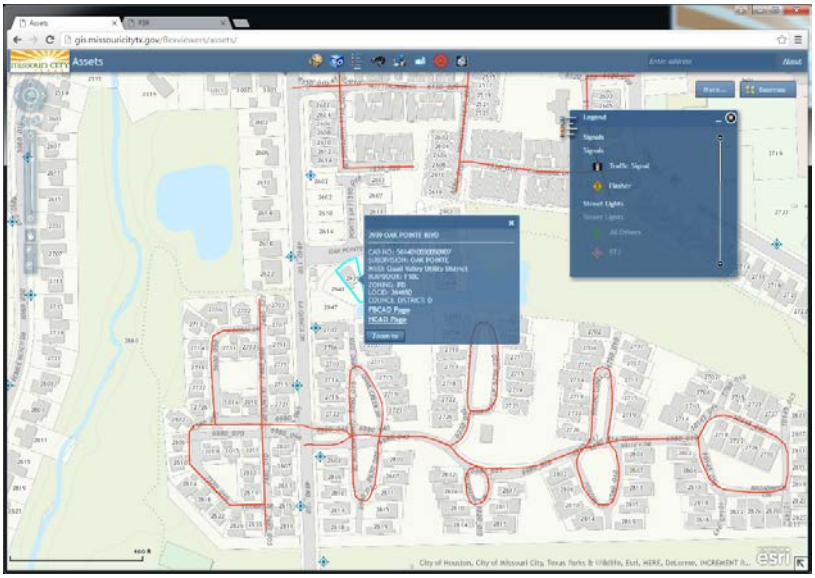
Several companies have developed application software, for example FME by Safe Software, capable of overcoming format and data model barriers to move data into various formats so that the City can leverage the use of depicting data spatially. In addition to FME, Esri offers a similar solution called ArcGIS Data Interoperability. Some examples of existing applications/databases currently being used by the City which should be linked spatially are SAP, AutoCAD, Chameleon, Munis, EnerGov, and Microsoft Excel.



Once the above information is maintained as digital data, it can be spatially enabled for use in the City's GIS and used like any other GIS layer. Staff mentioned that there are 10's of thousands of spreadsheets and 100's of Access databases across the City containing asset information. Staff needs to make sure they have the data stored with necessary

characteristics (XY coordinates or addresses) to geoenable this data. Recording data with these characteristics will allow it to be integrated into existing records or geoenabled.

Web GIS (Intranet and Internet)

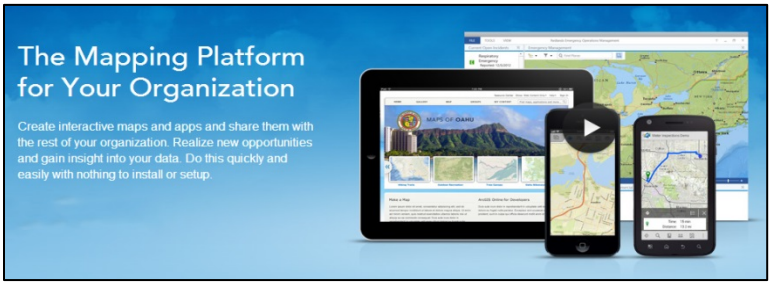


A need listed by several departments was the desire to have access to both intranet and Internet application(s). Currently, there are no enterprise wide solutions to view, explore, and print maps. Intranet portals would allow the GIS Team to create multiple portals with specific purposes; asset portal, fire portal, planning portal and others. Portals for each department or a group of departments should become the primary method for end-users to view and analyze data. These enterprise intranet applications provide a robust tool that allows specific configurations for the various departments while also providing the ability to share data. The GIS Team in Public Works should create the intranet portal method by using the Esri Web AppBuilder HTML5/Javascript Application as the primary tool. Each user group would be able to develop unique queries, reports and popups specific to their needs. An added benefit would be the elimination of redundant identity stores by utilizing Windows Integrated Security which would be a benefit of switching to an Enterprise GIS intranet solution. Rather than multiple intranet solutions for each department, one enterprise-wide intranet solution would eliminate multiple directories, security identity stores (i.e. user names and passwords) and data platforms. Windows Integrated Security would enable single sign on (SSO) capability between applications resulting in less user confusion, increased productivity, and a decrease in ISD support and administrative costs. An Enterprise GIS intranet application would reduce the amount of setup Citywide, require less refresher training, and would allow the City to push the envelope in advancing intranet application usage throughout all departments/divisions.

Much like a GIS Enterprise solution for intranet applications, various departments expressed the need for Internet applications. Even the departments which have mapping access through other software such as EnerGov would benefit from an Internet application that allows them to access information in the field or at home. Internet applications also make sharing data with the public possible and allow for employees to access, contribute, and collaborate while outside of the office. Some examples of Internet applications requested during the Needs Assessments include department-focused Story Maps, provide service locations to the public to show what is within walking distance, and the ability to show projects and pertinent information related to those projects such as the location, timeline, and funding details. All of these requests could benefit citizens and visitors within the City. There currently are not any public facing GIS applications for the residents of Simi Valley.

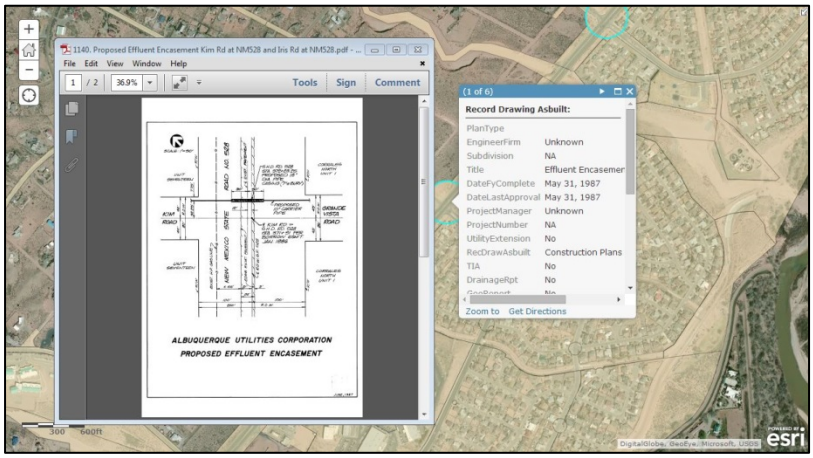
There are many options to fulfill the need for internal and external consumption of GIS, however, it is recommended that Simi Valley continue to employ ArcGIS Online for their intranet, internet, and mobile solution needs. One benefit of using ArcGIS Online is the ability to harness pre-developed applications and maps. ArcGIS Online could also be utilized for field mobility including data collection. Since ArcGIS Online is an integral part of the ArcGIS system, organizations can use it to extend the capabilities of ArcGIS for Desktop, ArcGIS for Server and other ArcGIS based applications.

ArcGIS Online



According to Esri, ArcGIS Online is a collaborative, cloud-based platform that allows members of an organization to use, create, and share maps, apps, and data, including authoritative base maps published by Esri. Through ArcGIS Online, organizations get access to Esri's secure cloud, where they can manage, create, store, and access data as published web layers, and because ArcGIS Online is an integral part of the ArcGIS system, organizations can use it to extend the capabilities of ArcGIS for Desktop, ArcGIS for Server, ArcGIS apps, ArcGIS Web APIs, and ArcGIS Runtime SDKs. ArcGIS Online is also a great solution for organizing and distributing GIS resources. This provides users with a one-stop shop for all data, maps, apps, documents, and anything GIS related.

ArcGIS Online implementation is a three-step process including planning, design, and deployment. Planning of agency logistics needs to be done carefully, with understanding of how multiple departments within ArcGIS Online will work together. Careful consideration of GIS data incorporation, groups, users, and applications will all need to be considered. The development process of ArcGIS Online begins with configuration of general settings, and then branches into setting up groups, web maps, the gallery, and much more (see System Architecture chapter for details related to system design strategies).



ArcGIS Online Departmental Portal

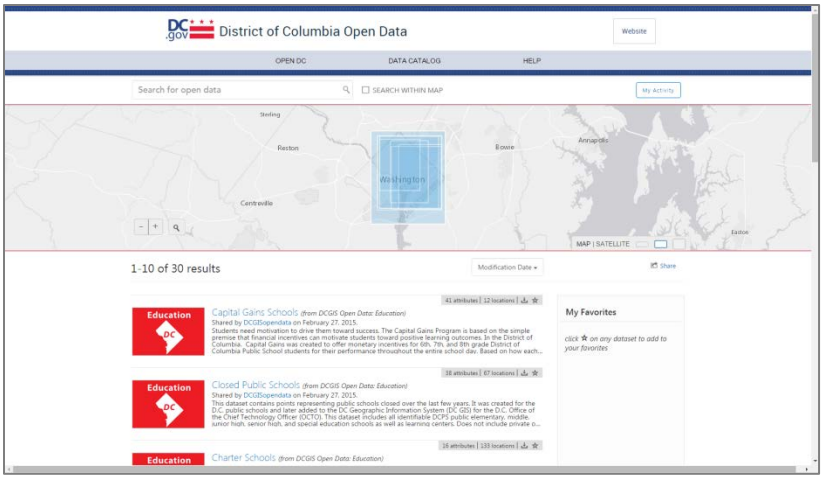
Now, with ArcGIS Online for Organizations and ArcGIS Solutions, municipalities can begin implementation of ArcGIS Online using preconfigured models. According to Esri, these model organizations are a guide for industries to begin to leverage ArcGIS Online quickly. Specific configurations will vary depending on the functional responsibilities of the local government and the maturity of their ArcGIS implementation.

The ArcGIS Online/Solutions (see ArcGIS Solutions section below) platform provides numerous ready to deploy applications. These applications can provide a powerful way to utilize GIS and should be configured during the development process. Users are added to the account and assigned appropriate permissions and access to the content they need. Using ArcGIS Online, Simi Valley can choose how to deploy maps and applications to management, office staff and field operations to reduce the need for printed maps and extend the use of GIS throughout the organization.

Mobile applications for iOS, Android, and Windows are available to download and configure (see ArcGIS Solutions section below). For example, ArcGIS for Android can quickly be deployed to Android tablets and smartphones to display and navigate maps, find addresses, identify GIS features, measure, find and share maps from ArcGIS Online, and collect data. The application can use either map layers hosted on ArcGIS Online or from the organizations City ArcGIS server. Similar functionality is available using the ArcGIS for iOS and ArcGIS for Windows.

Esri Open Data Portal

Currently, residents do not have the capacity to download any GIS data from the City. The City should consider implementing Esri's new Open Data portal to share GIS data with the public. The Esri Open Data Portal has the following features:

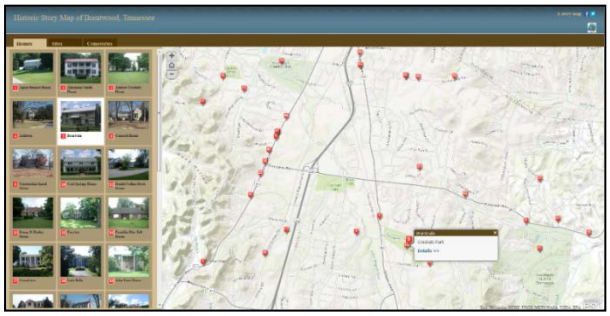


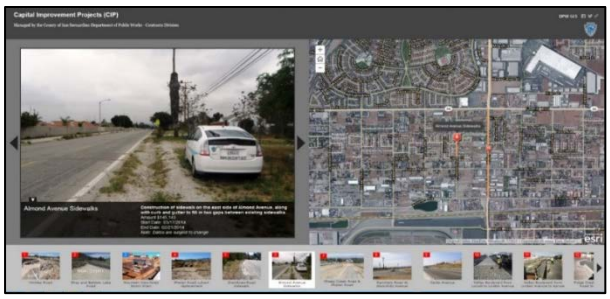
Esri Open Data Portal Interface

- As part of the ArcGIS Online subscription, users can use ArcGIS Open Data to share live authoritative open data. ArcGIS Open Data gives users a quick way to setup public-facing websites where people can easily find and download open data in a variety of formats (i.e. spreadsheet, KML, Shapefile, API).
- ArcGIS Open Data uses the ArcGIS Online groups the City will have to identify open data, allowing the City to quickly publish or remove open data. Open datasets automatically sync with the latest version of City sources. Additionally, it can integrate with other open data platforms, such as CKAN.

Esri Story Maps

Esri offers the ability to create Story Maps. These digital maps tell a unique story in a very intuitive and user friendly context. The GIS Team in Public Works has begun to leverage Story Maps. These maps allow Simi Valley to present and organize information geographically about places, events, issues, trends, or patterns. Story maps offer an interactive map with rich content including text, videos, and audio to enhance the user's experience. For Simi Valley, Story Maps would be an excellent way to display information





related to public meeting spaces, neighborhood associations, capital improvement projects, history of Simi Valley, special events, parks and trails, available properties and much more. Story maps lend themselves to presenting information that is cross departmental such as city projects and capital improvement projects (See left).

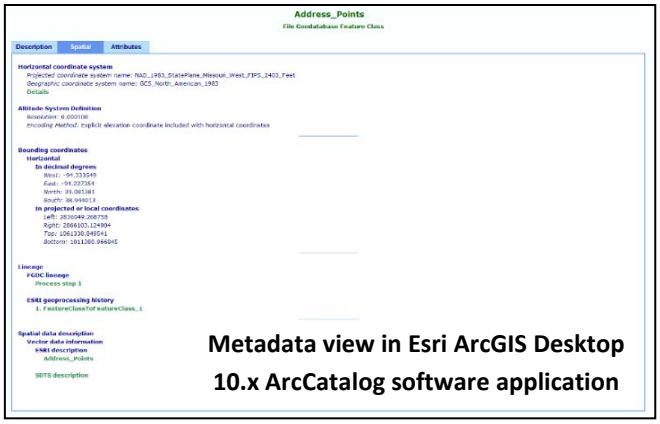
ArcGIS Solutions

Other solutions and applications are available through ArcGIS Solutions and the ArcGIS Marketplace. These applications are tailored for a variety of delivery methods including desktop, web, and mobile and are tightly coupled with ArcGIS Online. This section will focus on the desktop and mobile options. They may require some minor configuration changes to work with the Simi Valley geodatabase, but the level of effort will be well worth the value added.

It is important that City staff have a full understanding of the spatial and temporal accuracy of the GIS data. In relation to that concern, focus should be put on creating metadata of the City's GIS data, as well as notification when data is updated. Simply put, Metadata is "data about data." Metadata gives detailed information about all aspects of geospatial data. As a City-wide standard, metadata should be a requirement for all GIS data layers within the central database repository. Once all departments receive access to the City's centralized GIS data warehouse, an automated procedure and system of GIS data update notifications should be put in place, so that every City department knows exactly what and when important GIS data layers have been updated. A common communication medium for this task can be accomplished via email notifications to the affected City GIS users. Metadata should be managed using Esri's ArcCatalog 10.x software application.

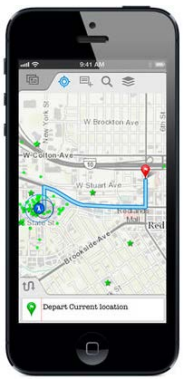
Metadata can give background information about:

- Source
- History
- Content
- Quality
- Condition
- Availability
- Processing
- Technical Details



Metadata view in Esri ArcGIS Desktop 10.x ArcCatalog software application

Mobile



Several departments mentioned the desire and need to have mobile GIS capabilities. Through ArcGIS Solutions there are a number of applications that can provide these departments with a solution. Collector for ArcGIS provides robust and intuitive tools for viewing maps, collecting and updating data, getting driving directions, and tracking and reporting areas visited. Collector operates through ArcGIS Online and with the newest release allows the ability for working offline. Collector is designed to work with iPhone and Android smartphones, but can also be used on tablets running iOS or Android. Collector is a simple way to expedite a mobile GIS solution that allows users from across the organization to have the power of GIS in their hands. Similarly, Esri also has two other Apps for smartphones and tablets: Explorer and Windows Mobile App.

For Windows devices, Esri provides ArcGIS for Windows Mobile and Windows Tablet. This application is a task-driven mobile solution that offers many of the same functions as Collector. ArcGIS for Windows Mobile offers a central management, configuration, and deployment strategy and allows for synchronization of GIS information from server and desktop clients. It also includes an SDK for building custom applications. One example of an ArcGIS for Windows Mobile application is the Utility Mobile Map. The Utility Mobile Map can be used by field operations and maintenance staff in Public Works to gain access to utility information. According to Esri, This application will help organizations deploy the Mobile Map in a disconnected or connected network environment. It is used for viewing detailed information about storm water and other assets in the field and allows field staff to locate a specific asset or area of interest and enter field notes. The mobile map also provides a series of information pop-ups in which map-centric content can be visualized and used to update the status of work activities in the field.

There are also a number of inspection type applications available that can be used as is or configured to meet the specific needs of Simi Valley. Inspection applications include storm water features, inlet, and code

violations. These applications can assist Simi Valley in capturing critical infrastructure data to make better decisions regarding capital improvement planning and more efficient and effective maintenance.

Desktop

There are several applications available for ArcGIS for Desktop that can prove useful available through ArcGIS Solutions. The following highlights some of the options.

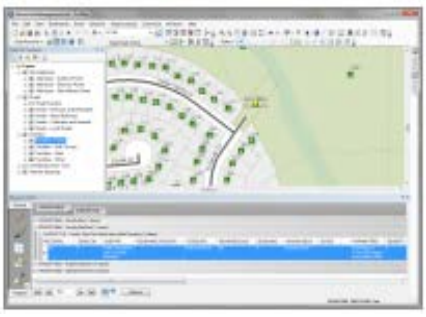
Address Data Management –

Address Data Management is an ArcGIS for Desktop editing map and a set of editing workflows for collecting and managing road centerlines with address ranges, facilities, site addresses, and related mailing address data. It is an editing map that can be used by mapping technicians in planning, public safety or land records organizations to streamline the collection, maintenance and use of authoritative address information.

The editing map also includes two add-ins. The Address Management add-in and address construction tools contain a series of custom editing tools that improve the editing experience for ArcGIS users working with roads and address information. For example, there are tools that:

- Add new road segments and allocate existing address ranges to the new segments
- Flip road segments so the direction of the line and address ranges are in sync
- Add new site address points and compute the proposed address from a location along the road centerline

The second add-in is called the Attribute Assistant. This add-in is an editor extension that uses a series of pre-defined methods to automatically populate attributes when updating and/or adding new features to the geodatabase. For example, one method will populate the full road name on each road centerline and site address feature from a valid list of road names contained in a master street name table. Other methods will help maintain the integrity of your address data by populating a unique identifier, last editor and last update date on each feature.



Data Reviewer for Addresses –

Data Reviewer for Addresses is a pre-configured set of ArcGIS Data Reviewer batch jobs (.rbj) for performing quality control on site

address and road centerline data. It enhances Address Data Management and is configured to work with the Local Government geodatabase.

ArcGIS Data Reviewer is an extension to ArcGIS Desktop that provides a set of quality control (QC) tools to simplify many aspects of automated and visual spatial data quality control. ArcGIS Data Reviewer offers over 40 out-of-the-box checks. Simi Valley can leverage these quality control checks to implement an efficient and consistent review process by automating spatial data quality control tasks. ArcGIS Data Reviewer checks may be run one at a time or can be grouped into a batch job. A batch job can also be scheduled to run once at a specific date and time or to run repeatedly at regular intervals.

Special Event Planning –

Special Event Planning is an ArcGIS 10.x editing map and a set of editing workflows for collecting and managing special events data. It is an editor that can be used by mapping technicians in a public safety or emergency management agency to streamline the development of special event data and maps.

Overview of Existing and Desired GIS Software

Integration of non-spatial data, development of intranet applications and the creation of Internet applications was echoed by nearly every department throughout Simi Valley. There are several individual applications used by City staff that have utilize GIS data and provide mapping: Versaterm, Granite XP, Infor Hansen, Spatial Wave, EnerGov, among others. Incorporating all of that GIS data together in one common browser is possible. An Enterprise GIS solution would best solve these needs and several departments have already implemented parts of Esri's Enterprise GIS solution. It is recommended that the City expand on their current investments in Esri's Enterprise Solution. Esri offers several products that would address the software needs requested throughout the City. Since Esri products already exist within several departments, an Enterprise Solution through Esri would require less implementation and training.

Each department that was interviewed during the needs assessment utilizes GIS or GIS products or has expressed an interest in using GIS tools. Additionally, each of the departments expressed the desire to expand their use of the technology. The following is a department by department overview of existing and

desired GIS software. The details of each of the needs can be found in the Needs Assessment chapter**.** In some cases, a specific product is named because that is the known solution (i.e. Collector Application). In other cases, a more general reference is used because multiple possible solutions exist (i.e. Intranet Data Browser).

5 PRIORITY MATRIX

A successful GIS is measured not by the amount of money spent, the volume of data, or the GIS software utilized but by the applications made available to staff and the public. The following is a matrix that analyzes each application and its priority ranking.

The categories analyzed and weighted were:

- *Existing* – Has the application already been acquired? If so, has it been fully implemented for the department's needs? The values are weighted as follows:
    - Existing, fully implemented, and in use = 5
    - Existing, nearly implemented, and/or used infrequently = 4
    - Existing, partially implemented, and/or used rarely = 3
    - Implementation just beginning = 2
    - Implementation planned = 1
    - Non-existing = 0
- *Cost Savings* – Potential of monetary savings to the organization or to the public
- *Improved Efficiency* – Does the application improve staff ability to do their job
- *Potential Life Savings* – The potential of the application to assist in preventing loss of life

- *Improved Decision Making* – Does the application enable staff to more quickly and accurately make decisions?
- *Enterprise Usage* – How widely will the application be utilized in the organization and throughout the department.
- *Improve Customer Service* – Does the application improve the customers' ability to access needed data and information?
- *Cost of the Application* – The cost to deploy the application was given a weight as follows:
    - $0 = 5
    - $1 - $10,000 = 4
    - $10,001 - $15,000 = 3
    - $15,001 - $20,000 = 2
    - $20,000 = 1
- *Generate Revenue* – Will the application potentially generate revenue for the City?

The maximum amount of points for any category was 5. Generally, the higher the total score, the higher the application priority. The scoring system is unique for each department. An application that is a 5 in Cost Savings for one department may be a 3 for another.

Existing and Desired Software	Existing	Cost Savings	Improved Efficiency	Potential Life Savings	Improved Decision Making	Enterprise Usage	Improve Customer Service	Cost of the Application	Generate Revenue	Total
City Manager's Office / Economic Development										
Intranet GIS Data Browser	0	3	4	0	4	5	4	4	0	**25**
Mobile Data Browser (AGOL)	0	3	5	0	4	5	3	5	0	**24**
Esri Business Analyst Online	0	4	4	0	4	0	2	4	2	**22**
Story Maps	0	1	1	0	1	4	5	5	1	**18**
Information Services Division										
Intranet GIS Data Browser	0	3	4	0	3	5	4	4	0	**24**
Community Services										
Intranet GIS Data Browser	0	2	4	0	4	5	5	4	1	**25**
Internet GIS Application	0	2	2	0	2	5	5	4	2	**22**
Data Mining Application	0	3	4	0	5	5	3	4	1	**25**
Story Maps	0	1	1	0	2	4	5	5	2	**20**
Mobile Data Browser (AGOL)	0	3	5	0	4	5	3	5	0	**24**
Field GIS (Collector)		3	5	0	4	4	4	4	0	**24**
Environmental Services										
Intranet GIS Data Browser	0	2	4	0	4	5	5	4	0	**24**
ArcGIS for Desktop	5	1	4	0	5	3	2	5	1	**26**
Data Mining Application	0	3	4	0	5	5	3	4	1	**25**
Mobile Data Browser (AGOL)	0	3	5	0	4	5	3	5	0	**24**

Existing and Desired Software	Existing	Cost Savings	Improved Efficiency	Potential Life Savings	Improved Decision Making	Enterprise Usage	Improve Customer Service	Cost of the Application	Generate Revenue	Total
Field GIS (Collector)	0	3	5	0	4	4	4	4	0	**24**
3D Analyst	3	2	2	0	3	1	2	5	0	**18**
Spatial Analyst	3	3	3	0	5	1	2	4	0	**21**
Internet GIS Application	0	2	2	0	2	5	5	4	2	**22**
Customer Services Division										
Intranet GIS Data Browser	0	2	5	0	4	5	5	4	1	**25**
Data Mining Application	0	3	4	0	5	5	3	4	1	**25**
Police Department										
Intranet GIS Data Browser	0	2	4	4	5	5	5	4	0	**29**
ArcGIS for Desktop	4	1	4	4	5	3	3	5	0	**29**
Internet GIS Application	0	2	2	2	2	4	5	5	0	**22**
Data Mining Application	0	3	4	2	5	2	5	4	0	**25**
Mobile Data Browser (AGOL)	0	3	5	3	4	4	4	5	0	**28**
Damage Assessment Application (Collector)	0	4	5	3	4	1	3	5	0	**25**
Executive Dashboard	0	2	2	3	3	2	3	5	0	**20**
Public Works										
ArcGIS for Desktop	5	1	4	0	5	3	2	5	1	**26**
Intranet GIS Data Browser	0	2	4	0	4	5	5	4	0	**24**
Internet GIS	0	2	2	0	2	5	5	4	1	**21**

Existing and Desired Software	Existing	Cost Savings	Improved Efficiency	Potential Life Savings	Improved Decision Making	Enterprise Usage	Improve Customer Service	Cost of the Application	Generate Revenue	Total
Application										
Esri Open Data Portal	0	2	3	0	2	4	5	5	0	**21**
Executive Dashboard	0	3	2	0	3	2	3	5	1	**19**
Data Mining Application	0	3	4	0	5	5	3	4	1	**25**
Mobile Data Browser (AGOL)	0	2	5	0	4	4	4	4	0	**24**
Citizen Problem Reporter	3	3	5	0	4	2	5	4	0	**26**
Spatial Analyst	3	3	3	0	5	1	2	4	0	**21**
Story Maps	0	1	1	0	2	4	5	5	2	**20**
Work Order Management System	3	2	4	0	5	2	4	1	0	**21**
Field GIS (Collector)	0	3	5	0	4	4	4	4	0	**24**
AVL /Network Analyst Extension	0	2	5	1	4	2	4	1	0	**19**

The following tables help highlight the most critical and highest priorities of the entire organization. Using the information above, these tables summarize the total score received for an application/solution and the number of times an application/solution is requested. Using this information can assist Simi Valley in prioritizing the planning, acquisition, and deployment of these solutions.

Applications	Total Sum of Scoring
Intranet GIS Data Browser	178
Data Mining Application	125
Mobile Data Browser (AGOL)	124
Collector Field and Damage Assessment	97
Internet GIS Application	87
ArcGIS for Desktop	81
Story Maps	58
Spatial Analyst	42
Executive Dashboard	39
Business Analyst Online	22
Esri Open Data Portal	21
AVL	19
3D Analyst	18

Applications	Num. Times Requested
Intranet GIS Data Browser	7
Data Mining Application	5
Mobile Data Browser (AGOL)	5
Internet GIS Application	4
Collector Field and Damage Assessment	4
ArcGIS for Desktop	3
Story Maps	3
Executive Dashboard	2
Spatial Analyst	2
Esri Open Data Portal	1
Business Analyst Online	1
3D Analyst	1
AVL	1

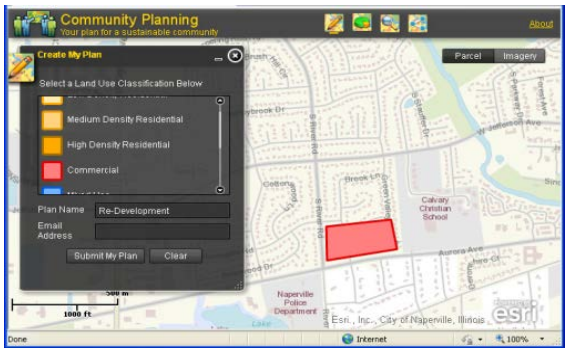
6

FINAL SOFTWARE CONSIDERATIONS

As discussed in the first section of this chapter, Simi Valley must consider each of the components of GIS while evaluating, selecting, planning and deploying GIS software. Following a process helps ensure successful deployment of ready to use applications that will have positive impacts across the organization.

Until recently it was difficult to acquire applications that met the needs of local governments. However, that has changed dramatically over the past few years. Now local governments can acquire the tools they need from software vendors. Creating and maintaining applications in-house can still be accomplished. However, doing so generally requires the employment of a highly skilled programming team to maintain and improve these applications. Organizations run the risk of developing highly customized applications only to lose the in-house expertise to maintain and expand the application moving forward. This leaves the organization vulnerable. Therefore, it is recommended that Simi Valley strive to implement only off-the-shelf applications. In cases where these applications need to be augmented, the City should pay the vendor to add this functionality to the application.

This plan has recommended the extensive use of intranet and internet applications. It is important that the City ensure these solutions are all-inclusive and do not create stove pipes. In many cases, these applications serve as data viewers and provide some analytical capabilities. However, many of these solutions fall short of true enterprise-wide functionality. A true enterprise-wide



solution will not only offer viewing and analytical capabilities but will allow the City to add a host of other tools via modules or widgets to the application. This includes; AVL, routing, video feeds, minor editing of data, plume generation, and other tools. If not, then separate applications have to be implemented for each of these needs thus creating application stove pipes and requiring customers to go to various applications to get what they need. At a minimum, the City should strive to make all GIS applications maintain continuity in the user interface and the database source. It is important to note that some departments may elect to acquire applications specific to their needs. In these cases, it is incumbent upon these departments to budget for maintenance of these applications. It should not be the responsibility of the GIS Team in Public Works.

Such application deployments are achievable. For example, utilizing Esri's ArcGIS for Local Government (AG4LG) includes a host of resources that allow local governments to rapidly deploy GIS technologies. Simi Valley can immediately take advantage of tools for inspections, dashboards, capital projects, community planning, emergency management maps, and many others.

Another consideration is the need to always involve the City GIS experts when making an IT acquisition. Every enterprise software product should embrace the need to geo-enable the data that is captured in the system. Therefore, it is important to select tools that embrace this need. Often organizations err by involving the GIS team after the IT system has been acquired. This leads to inefficiencies and data/software stovepipes.

Simi Valley is well positioned to quickly advance their GIS capabilities. By carefully considering and selecting the right software solutions and planning for deployment, the City will realize gains in efficiency, better decision making, cost savings, and increased customer service through expanded enterprise usage. Applications can be seen as the ultimate culmination of a successful enterprise-wide GIS.

SYSTEM ARCHITECTURAL DESIGN

CITY OF SIMI VALLEY

CALIFORNIA

GIS ASSESSMENT AND REVITALIZATION PLAN

SECTION OUTLINE

1 INTRODUCTION

The following Chapter summarizes the existing infrastructure conditions and departmental comments. This section also included an Architecture Assessment and Enterprise GIS Design.

City of Simi Valley Infrastructure Findings
The City needs to move away from ArcGIS for Server Workgroup Version and migrate to ArcGIS for Server Enterprise Version. This will provide the City with the capacity to implement several additional tools such as ArcGIS Online.
City needs to move away from primarily utilizing Desktop applications for GIS and embrace web-based GIS solutions. This will increase accessibility to more departments and provide staff with an easy-to-use application instead of Desktop versions of GIS that might be more than the staff needs.
Increase IT infrastructure to support enterprise GIS. Increasing the number of users and the accessibility of GIS to all staff will require IT infrastructure improvements to accommodate an increase in usage.

The following recommendations are based on best GIS business practices in local government, and GTG's understanding of the key factors for deploying an enterprise and scalable solution that will sustain the City of Simi Valley well into the future.

GIS is currently operating as a hybrid governance model with centralized governance characteristics in Simi Valley with the core GIS staff asset residing in Public Works. Recommendations have been made to improve the existing GIS governance model where technology, data, and software is managed by expanded GIS Staff in Public Works and users are enabled in a distributed fashion (see Governance Model chapter for more information). GIS architecture has a significant impact on this recommendation and interrelates to the software deployment suggestions. For example, easy to use data browsers and mobile applications have been recommended that rely on a central GIS server and the use of ArcGIS Online. GIS browser technology will allow non-GIS users to quickly access GIS data, create their own reports, and create their own maps. This allows the casual user to have quick and user friendly access to GIS. This approach enhances and expands the GIS usage at the department level in which end users do a majority of their own GIS tasks while relying on a central group of GIS experts for assistance with high-level operations. Mobile GIS extends GIS capabilities into the field allowing for a multitude of functionality including viewing maps, correcting attributes, and collecting new features.

Within the current GIS governance structure, there is a central GIS Manager responsible for coordinating GIS initiatives for Simi Valley. The Information Services Division provides services related to hardware, software, databases, and networking for GIS. Other GIS functions are performed by GIS staff in Public Works. Currently, the City of Simi Valley stores their GIS data in a Microsoft SQL Server Express environment, allowing for easier sharing of the GIS data among the core GIS users, although this is not sufficient for an enterprise-wide system. Additionally, to ensure continuity in Simi Valley's GIS data, implementation of Esri's Local Government Information Model where appropriate is strongly recommended.

End User Applications

The needs assessments detail each need identified and the appropriate method to meet those needs. The overall recommendation is to acquire or create end-user applications that utilize the central Esri compliant database. Some of these applications will be targeted to specific departments while others are enterprise wide.

Desktop vs. Web Applications

Traditionally, GIS professionals have concentrated primarily on data compilation and focused application projects, investing time in creating GIS databases and authoring geographic knowledge. Desktop-based GIS applications have been used by end-users for connecting to geographic datasets via shared databases, building workflows for data compilation and quality control, authoring maps and analytical models and documentation. This was all based on selected licensing structure within the organization. Organizations commonly took advantage of the Esri Single Use or Concurrent licensing structures. The Single Use license is dedicated for each computer or network access point that has use rights for software, data, or documentation. The Concurrent license permitted execution of the software on any computer on the network and was controlled by a license manager application. This traditional distribution structure limits GIS application usage based on budgeted number of licenses. Simi Valley still follows this model.

ArcGIS Server Architecture

Progressively, an increasing number of GIS professionals have begun to use and exploit their results in numerous GIS applications and settings. The work of authoring and serving geographic data will largely remain within the domain of GIS professionals. However, these professionals will also increasingly create server-based applications that allow common users, both internal and external to the organization, to have access to the power of GIS. The influence of GIS is still growing rapidly and will provide a powerful medium for managing, visualizing and communicating information between GIS professionals and the end-users. ArcGIS Server offers enterprise level functionality, which directly addresses Single Use and Concurrent Use license limitations by offering unlimited GIS application usage.

2
ARCHITECTURE VISION

Simi Valley currently employs the Workgroup edition of ArcGIS for Server. This limits several aspects of operability for the City including simultaneous connections, multiuser GIS database storage capacity, and Maximum number of Portal for ArcGIS named users. The recommendation is for Simi Valley to move to an Enterprise version, which can support unlimited connections and licenses (see graphic below) for an enterprise deployment.

	Capacity Level	
	Workgroup	**Enterprise**
Simultaneous connections to multiuser geodatabase	10	Unlimited
Multiuser geodatabase storage capacity	10 GB[1]	Unlimited
Maximum number of licensable cores	4 cores	Unlimited
Maximum number of Portal for ArcGIS named users	10	Unlimited
Distributed deployment of ArcGIS for Server components	Not supported[2]	Supported

1 - ArcGIS 10.4 for Server Workgroup ships with Microsoft SQL Server Express 2012, which is limited to databases of up to 10 GB in size.

Simi Valley envisions a common system of GIS capabilities and resources that support the needs of a growing number of departments that use GIS in their operations. Shared resources, including enterprise data warehousing, data, services, and applications should be centrally provisioned and available throughout the City's network.

At the same time, most departments should maintain resources, particularly data resources that are specific to them. The system must provide flexibility to end-user departments to use the client-side technologies of their choosing (e.g. desktop applications, browser-based applications, mobile applications, etc.).

Finally, the system must provide flexibility to support new operations/workflows and new business units over time.

3
BUSINESS ARCHITECTURE

This section describes the business requirements and preferences that guide the design recommendations recommended in this chapter. The design will allow the integration of new needs and new business units over time. However, it is based on the specific requirements described by the departments that participated in the planning meetings:

- **City Manager's Office**
- **Community Services Department**
- **Customer Service Division**
- **Environmental Services Department**
- **Information Services Division**
- **Police Department**
- **Public Works Department**

The following business requirements were identified during the planning meetings as important motivators for the creation and design of an enterprise GIS.

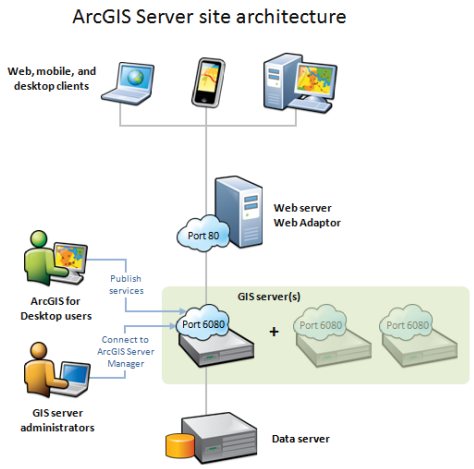
No.	Item	Description
1	Improve GIS performance and provide a sustainable platform for future expansion	Limited server architecture needs to be replaced with current and better performing technology to accommodate an enterprise-wide GIS platform.
2	Use standard operating procedures	Using standards for GIS administration, data development, and databases will improve the effectiveness of the enterprise GIS

3	Deploy standardized geodatabase using a robust enterprise relational database to ensure access to all departments and users	Existing GIS data needs to be mapped and migrated to the Local Government Information Model on an enterprise Microsoft SQL Server platform.
4	Accommodate integration with various 3rd party applications	A majority of databases at the City should be integrated with GIS including Hansen and Tyler Munis. That can mean data mining for viewing in GIS and/or pushing GIS data into non-spatial databases.
5	Maximize ArcGIS Server performance	Provide strategies (e.g. process configuration, cached map services, memory configuration) to ensure maximum performance of ArcGIS Server

4

RECOMMENDED SYSTEM ARCHITECTURE

Simi Valley should enhance and expand its implementation of a client-server based GIS architecture that is centered on the geodatabase and ArcGIS for Server. As the graphic illustrates below this centrally managed system will support all GIS data and applications. In turn, data and applications specific to the needs of each department will be made available to the end users through various applications and methods.



Enterprise GIS Centered on the Geodatabase and ArcGIS for Server

The existence of centrally-located enterprise geodatabase(s) should be the cornerstone component in Simi Valley's GIS program. The geodatabase will be accessed directly through multiple desktop GIS applications, as well as various Esri ArcGIS services. For Simi Valley, it is recommended that staff continue to organization the City's geodatabase around Esri's Local Government Information Model (LGIM). As previously discussed, Simi Valley currently utilizes and maintains a Microsoft SQL Server Express database to host its spatial databases. The City needs to upgrade its server to enterprise Microsoft SQL Server to accommodate a more robust, enterprise-wide system including an enterprise version of ArcGIS Server.

The second major component of Simi Valley's recommended GIS architecture is the Esri ArcGIS for Server (AGS) suite. AGS consists of three major parts: GIS Server(s), Web Adaptor(s), and Web Server(s). See the Hardware Recommendations section below for a summary of these components.

5
LICENSING

Currently, a handful of departments are using GIS software. It is recommended that all GIS software licensing is managed and coordinated by the GIS Manager. The use of concurrent licensing expands the availability of desktop software; therefore, all Esri ArcGIS desktop and extension licenses should be managed through this centralized system.

In regards to GIS software, the following are the licenses available to the City:

- ArcGIS Desktop Products - ArcGIS Desktop Advanced, ArcGIS Desktop Basic
- ArcGIS Desktop Extensions - 3D Analyst, Spatial Analyst
- ArcGIS for Server – Workgroup Standard 4 Cores

Although GIS is being used now throughout many Simi Valley departments, it is anticipated that many more users will need varying access to the GIS in the near future. The following chart details the anticipated users of GIS within Simi Valley based on the needs assessment. Additionally, numerous public access portals have been recommended pushing the number of potential GIS users higher.

Projected GIS Software Tier-Level Users by Department				
City of Simi Valley Departments/Divisions	Tier 1 Flagship Users	Tier 2 Analytical Users	Tier 3 Browser Users	Total Projected GIS Users
City Manager's Office	0	0	6	6
Customer Services	0	0	3	3
Information Services	0	0	2	2
Community Services	0	2	11	13
Environmental Services	1	3	25	29
Public Works	3	3	100	106
Police Department	0	3	180	183
Total	**4**	**11**	**327**	**342**

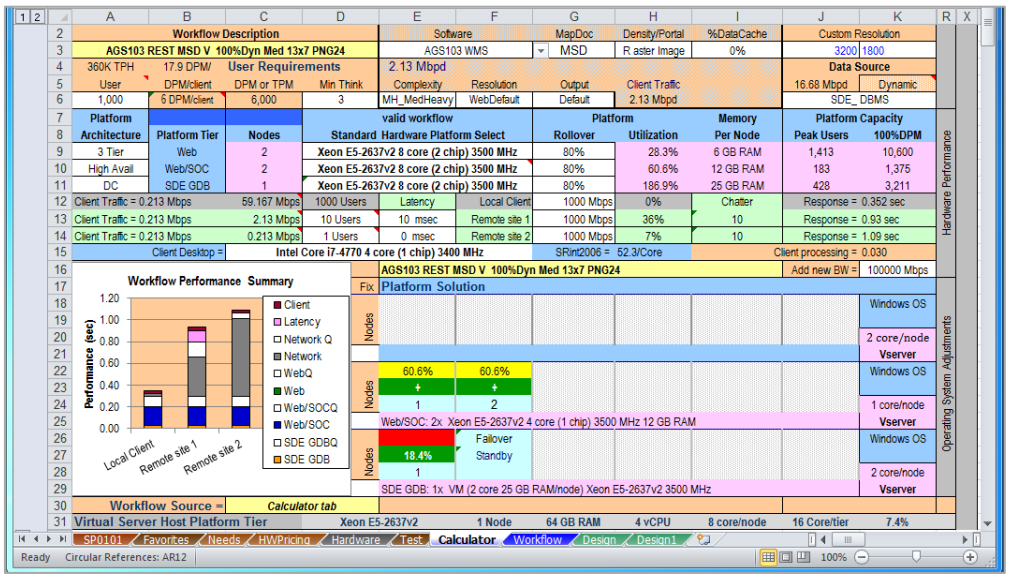
6

SYSTEM ARCHITECTURE DESIGN

System architecture design is the process of aligning business needs with technology infrastructure to ensure that the business requirements are being adequately met. This section will address various aspects of the design process and develop recommendations for a system design that will meet the needs of Simi Valley for the next several years.

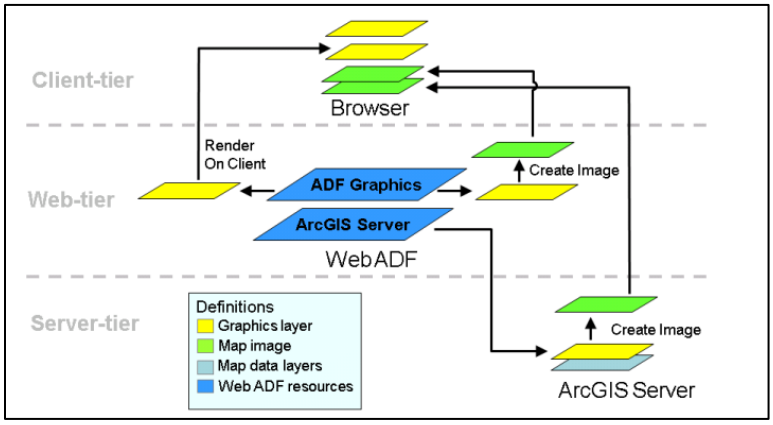
Platform Sizing

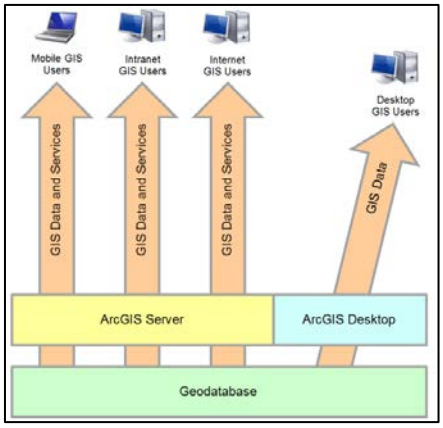
GTG makes use of the Esri 2016 Capacity Planning Tool (CPT) for the purpose of properly sizing the GIS server environment and for developing recommendations for the LAN/WAN configuration. The CPT is an Excel spreadsheet that contains logic for translating user workflow needs into specific network and platform capacity requirements. Output from the CPT will be provided to quantify and justify the recommended system architecture.



Server Software Performance

Within an enterprise GIS, the server technology deployed to support the GIS is often the most critical hardware/software component. The City currently maintains a server-based GIS environment which hosts the ArcGIS Server product. Increasingly, many organizations are turning to server based architectures (Figure below) for disseminating spatial data. ArcGIS Server, via map services, can provide spatial content through browser technology and circumvent the need to install software on user's local desktops. ArcGIS Server offers enterprise-level functionality, which directly addresses Single Use and Concurrent Use license limitations by offering unlimited GIS application usage via a web browser.





The implications for the City are that end users accessing GIS resources in a web browser will more actively utilize GIS enterprise-wide, become more proficient users, and be able to perform more complex GIS tasks. *That is, if the web browser based application is fully functional and used regularly by staff.*

By incorporating this level of GIS access into an organization, the City will realize an increased return on investment (ROI) based on steady increases of internal and external GIS usage, developing server based applications and eliminating costs for desktop licensing.

It is recommended that the City develops a client-server based enterprise GIS architecture that is centered on the enterprise geodatabase and ArcGIS Server. As the graphic at right illustrates, the City's centrally managed system should house all GIS data and applications. In turn, data and applications specific to the needs of each department will be made available to the end users through various applications.

The existence of the centrally-located *enterprise geodatabase* should be the cornerstone component in the City's GIS program. An enterprise geodatabase can support numerous desktop and browser based users.

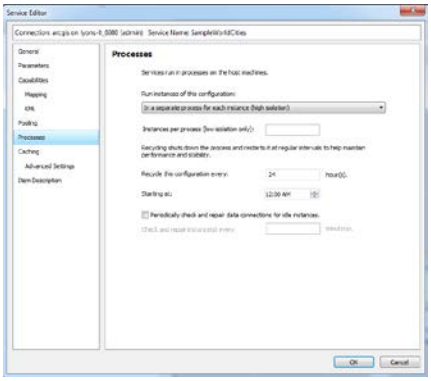
The GIS server's performance is critical to meeting the business requirements of an organization. Server software performance tuning can ensure that the ArcGIS Server software is operating at optimal levels.

The following establishes configuration settings that should be used to optimize ArcGIS Server performance.

Process Configuration

ArcGIS Server has two settings for process configuration, high isolation and low isolation. These processes are a component of the Server Object Container, or SOC. These process isolations are set when publishing an ArcGIS Server map service. The isolation determines how the server manages ArcSOC processes:

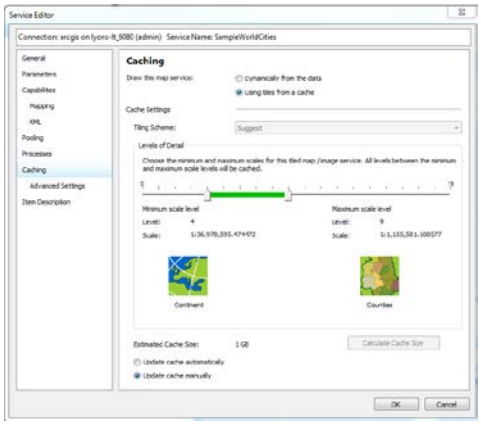
- Each process represents a unique map service
- High isolation results in a single threaded service
- Low isolation results in multiple threads (up to 256)
- High isolation is more stable
- Low isolation can result in more efficient instance capacity adjustment



Best Practice: High isolation is more stable and the better choice for typical map services

Cached Map Services

ArcGIS Server provides map cache services to help improve the display of spatial data layers. The cached map service consists of a pyramid of pre-processed vector data or image data. The number of pyramid levels can be specified to allow for caching of the source data at various scales and resolutions. Properly establishing the map cache settings can greatly improve the display performance for GIS clients.



Best Practices:

- Using cached tiles provides a highly scalable static map service
- Develop high quality base maps – they display just as quickly as simple tiles
- Use preconfigured Caching Tool instances when generating map cache

Memory Configuration

Sufficient memory resources are critical to the proper functioning and performance of ArcGIS Server. As the number of map services increases, so does the corresponding need for memory. If insufficient memory is available, map services will begin to fail due to:

- Increased memory paging
    - Active processes will crash when swapped to memory during execution

Following are the recommendations for ArcGIS Server:

- Minimum of 4GB per core
- Large data file (imagery) will likely require more memory
- Additional memory will typically improve data throughput performance
- Additional memory will allow for more map services

Best Practices:

- Having sufficient physical memory is critical to having a stable system and for providing the best performance
- On average, have no more than 10 map service instances per CPU core
- Do not have extraneous or unnecessary map services deployed on the server

GIS Data Administration

How GIS data is managed is critical to the success of an enterprise GIS. Storage methods have changed dramatically over the past decade being driven mostly by technology. Choosing how to manage, access, and organize these data resources is very important to the system architecture design.

ArcSDE Geodatabase

The geodatabase is the native storage format for ArcGIS. The ArcSDE application geo-enables enterprise relational databases (e.g. MS SQL Server, Oracle, etc.) allowing for the storage and retrieval of spatial GIS data. The enterprise geodatabase consists of an application tier (ArcObjects and ArcSDE) and a data storage tier (the relational database). The responsibility for managing geographic data in an enterprise geodatabase is shared between ArcGIS and whichever RDBMS is used. ArcSDE supports long transactions using versions of the database. This is referred to as “versioning” in the ArcGIS environment. Thousands of concurrent versions can be accommodated in a single database. The “default” version represents the

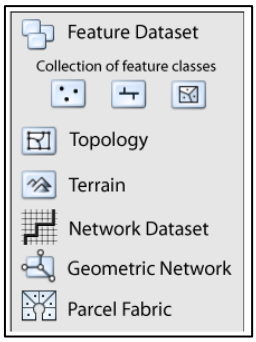
primary GIS data, while the versions represent potential changes to that data. Geodatabase versioning allows multiple editors to access the same database and edit data concurrently. A process is provided for each editor to "reconcile" and "post" their edits back to the geodatabase's default version.

In a typical editing environment, numerous edits are being made to the database on a daily basis increasing the size of the version state tree. This process increases the size of the Add and Delete tables (A&D) in the database. As the A&D tables grow, they can eventually cause system performance degradation. It is important to compress the database on a regular basis to reduce the number of states and reduce the size of the A&D tables.

Best Practices:

- Use a versioned geodatabase when managing multiple edit sessions
- Database compression should be conducted on a scheduled basis to reduce the existing database states

Local Government Information Model



Proper design of the enterprise GIS database is critical to effectively support organizational data needs, applications, data maintenance and update, data security, etc. Simi Valley currently maintains GIS data in the SQL Server Express environment and some of the data layers are stored as standalone feature classes. Some of the data layers are stored in feature datasets due to the need for topology or geometric networks but overall the database design is not standardized.

It is recommended that the majority of the standalone feature classes be placed in feature datasets. A feature dataset is a collection of related feature classes that share a common coordinate system. Feature datasets are used to spatially or thematically integrate related feature classes. Their primary purpose is for organizing related feature classes into a common dataset for building:

- a topology
- a network dataset
- a terrain dataset
- a geometric network
- a parcel fabric

Additionally, feature datasets can be used to:

- Organize thematically related feature classes
- Organize data access based on database privileges
- Organize features classes for data sharing

The LGIM contains a variety of logically defined feature datasets and feature classes that are common to most local government's spatial data needs.

The LGIM connects silos of information in an organization and integrates processes across typical government departments. It helps provide for more effective operations, better communication, saves time and money, and engages citizens in more meaningful ways. In addition, it also supports data sharing between local governments and regional, state, and federal agencies. Following are the feature datasets defined by the LGIM:

- Address
- Administrative Area
- Assessment Information
- Cadastral Reference
- Capital Planning
- Citizen Service
- Demography
- Election Administration
- Election Results
- Elevation
- Emergency Operations
- Facilities Streets
- Field Crew
- Infrastructure Operations
- Land Use Operations
- Land Use Planning
- Parcel Editing
- Parcel Publishing
- Raster Data
- Public Safety Planning
- Reference Data
- Sewer Storm water
- Storm water
- Water Distribution

Best Practices:

- Use geodatabase versioning in the edit environment to allow multi-user editing and to promote quality control
- Perform scheduled database compressions to clean out the A&D tables and ensure optimal database performance
- Continue to develop the City's geodatabase following the LGIM model. New data created needs to be designed along LGIM standards.
- The LGIM provides a standard data model for improved integration with third party applications and databases

GIS Imagery Data Architecture

Image data has become one of the most useful layers available in GIS. Imagery today is typically very accurate spatially and provides a snapshot of real world conditions. It can be used to understand real world relationships of terrestrial features more readily than other GIS data. Imagery, however, has very high storage requirements and can require significant bandwidth on LANs and WANs.

In ArcGIS, imagery can be accessed in a variety of ways:

- Direct access by ArcGIS Desktop
- ArcGIS Server image services
- Direct access to preprocessed imagery cache tiles

Imagery caching is an important tool for providing potentially large improvements with image retrieval and display performance. Image caching creates a preprocessed pyramid of imagery tiles configured at a range of scales. This greatly improves display times for clients since the preprocessed cached tiles are sent to the client without future processing. Following is a recommended image caching workflow:

- Create mosaic dataset
- Serve image services to key users
- Create map cache
- Maintain mosaic dataset
- Update cache

Imagery, whether stored in native file format or as raster data in an ArcSDE geodatabase, can consume a large amount of storage space. In some organizations, due to the storage requirements of imagery, upwards of 75% of the storage needs of the enterprise GIS can be attributed to image data. This mandates that the organization pay particular attention to its selected storage architecture to ensure that it is adequately designed.

Best Practices:

- If an image service will not have its properties modified by users and it will be used as a basemap, use caching to increase display performance and improve scalability
- Due to large storage requirements of image data, proper planning of the storage architecture is very important

Storage Architecture Options

The modern data center typically relies on the Storage Area Network (SAN) for its enterprise storage needs. The SAN is a high-speed network of storage devices that also connects those storage devices with servers. It provides block-level storage that can be accessed by the applications running on any networked servers.

SANs typically use high speed fiber for connectivity resulting in the elimination of data transmission bottlenecks. Also, because SANs usually offer multiple connections to and from the data center's servers, they also improve availability. In addition, separating the storage from the servers frees up the computing resources on the servers for other tasks not related to storage.

SANs are particularly helpful in backup and disaster recovery settings. Within a SAN, data can be transferred from one storage device to another without interacting with a server. This speeds up the backup process and eliminates the need to use server CPU cycles for backup.

The SAN is comprised of any number of hard disk drives (HDD) or solid state drives (SSD) that are typically in a RAID configuration. RAID is a technology for striping data across multiple drives to improve data redundancy or performance or sometimes both. The type of RAID configuration selected is an important consideration when looking at the GIS system architecture.

The most common RAID configuration used with enterprise GIS for data storage is RAID 5 which offers the following capabilities:

- Consists of block level striping with distributed parity
- If one disk fails, the parity bit on the parity disk can be used to restore the missing data
- Provides optimum disk utilization and near optimum performance

Relational databases like SQL Server store data files, index tables, and log files, all of which are associated with a specific database. While RAID 5 is commonly used for the large data files associated with a database, it is recommended that RAID 1/0 be used instead for the index tables and log files. RAID 1/0 provides both mirroring of data and high performance data access. It is also the highest cost solution effectively cutting in half the available disks. Following is a recommended relational database storage configuration:

- Data Storage Files (vector data) – RAID 5 volume (1)
- Data Storage Files (raster data) – RAID 5 volume (2)
- Index Tables and Log Files (vector data) – RAID 1/0 volume (1)
- Index Tables and Log Files (raster data) – RAID 1/0 volume (2)

The above configuration would result in four volumes being created on the SAN of an appropriate size to accommodate the database requirements. This would result in an optimized database environment that would provide optimal performance to the enterprise GIS.

<u>Best Practices:</u>

- The SAN is a best of class storage solution for an enterprise GIS
- Database index and log files should be stored on RAID 1/0 volumes
- Database files storing GIS vector and raster data should be placed on RAID 5 volumes resulting in minimum performance impact
- Monitor disk I/O performance to identify when disk contention is causing performance issues
- Configuring a SAN with Solid State Drives would provide best of class performance

Network Communications

An enterprise GIS is one of the heaviest contributors to network traffic in a LAN/WAN environment. This is in large part due to the graphic intense experience that GIS provides the end user and to potentially large data files (e.g. aerial photography) being transmitted across the network. The capacity and performance of the network is therefore a very important component of the system architecture design.

Capacity & Performance

The City has a 1GB LAN/WAN supporting its enterprise GIS. As expected from a well configured network, user feedback provided by City staff indicates that the City's LAN/WAN provides excellent performance and a good user experience for the GIS end users.

Workflow Labels	Requirements Analysis Types of Workflows	Live User Environment Peak Concurrent Users	TPH	Network Mbps	Network Bandwidth Mbps Data {TPH}	NW %Cap Traffic Mbpd	Wkflow Chatter Latency msec	Display Response Time (sec)
<Name>	Standard							
LAN	LAN_WAN Clients		Services		1000 Mbps	9%		
S DeskEdit	S DeskEdit_ArcGIS Desktop Editor	4		6.667	DB {2,400}	10.000	200	0.39
S DeskView	S DeskView_ArcGIS Desktop Viewer	11		18.333	DB {6,600}	10.000	200	0.39
S WebMap	S WebMap_Web Mapping Service	327		65.400	DB {117,720}	2.000	10	0.48
Internet	Internet_Clients				45 Mbps	44%		
S WebMap	S WebMap_Web Mapping Service	100		20.000	DB {36,000}	2.000	10	0.54
					1.5 Mbps		0 msec	
Standard	Total Throughput	442						

The City's network has adequate bandwidth (as shown in Requirements Analysis) available but care should be taken to recognize any new latency that may occur in network communications. Network latency is the round-trip travel time for a single packet of data. Various things can create latency such as aging and/or defective switches or routers. Increased latency results in a GIS user having to wait longer for a screen to refresh or for a process to complete and has a detrimental impact on the user experience.

Suitability Analysis

It is typical for network administrators to benchmark and maintain performance metrics on their networks. The peak bandwidth needs of the network must first be understood by reviewing site traffic workflows and summing their bandwidth requirements. This can be accomplished using the Esri CPT Design tab.

In the LAN/WAN network configurations graphic above, it can be seen that the City's existing 1GB network infrastructure is more than up to the task of supporting network traffic for the enterprise GIS. It is a best

practice to design the network to support double the anticipated traffic. That would equate to the following design needs:

- LAN/WAN > 180 Mbps
- Internet > 40 Mbps

These requirements are currently being met by the existing LAN/WAN/Internet environment

Best Practice: The LAN/WAN should be periodically monitored to ensure latency does not increase on the network

Platform Performance

The performance of GIS applications is very important but the performance of the underlying computer hardware is also very important and in this section the importance of hardware technology will be the focus. Selecting the right hardware will provide greater performance, improve efficiencies, and provide a better return on investment.

Performance Baseline

The performance of computer hardware that supports GIS has increased dramatically over time. Platform per core performance is now 5.3 times faster than it was 10 years ago. The trend has been faster hardware and lower platform cost. For the purpose of measuring ArcGIS software performance, Esri has established a benchmark hardware system each year to identify the best available platform for GIS. Platform performance is measured using SPEC performance benchmarks. The Standard Performance Evaluation Corporation (SPEC) was established in 1988 by a small number of workstation vendors for the purpose of creating an industry recognized realistic benchmark of computer hardware performance. Esri specifically uses the "SPECrate_int2006" per core benchmark baseline for measuring hardware performance of various systems (figure below). SPECrate_int2006 is a process intensive benchmark that stresses a system's processor, memory subsystem, and compiler and provides an accurate and consistent gauge of a system's performance.

	A	B	C	D	E	G	H	N	O	P	R
1	Vendor (SPEC link)	System	# Cores	# Chips	# Cores/ Chip	Processor	MHz	Baseline	Base/ core	HW Avail	CPU
2	IBM Corporation	IBM Power E880 (4.35 GHz, 64 core, RHEL)	64	8	8	POWER8	4359	4170	**65.2**	Nov-14	POWE
3	IBM Corporation	IBM Power E880 (4.35 GHz, 64 core)	64	8	8	POWER8	4359	4130	**64.5**	Nov-14	POWE
4	IBM Corporation	IBM Power E870 (4.19 GHz, 80 core)	80	8	10	POWER8	4192	4830	**60.4**	Nov-14	POWE
5	Hewlett-Packard Comp	Proliant BL460c Gen9 (3.50 GHz, Intel Xeon E5-2637 v3)	8	2	4	Intel Xeon E5-2637 v3	3500	459	**57.4**	Sep-14	Inte
6	Cisco Systems	Cisco UCS B200 M4 (Intel Xeon E5-2637 v3 @ 3.50GHz)	8	2	4	Intel Xeon E5-2637 v3	3500	457	**57.1**	Sep-14	Inte
7	Dell Inc.	PowerEdge T630 (Intel Xeon E5-2637 v3, 3.50 GHz)	8	2	4	Intel Xeon E5-2637 v3	3500	457	**57.1**	Sep-14	Inte
8	Hewlett-Packard Comp	ProLiant DL380 Gen9 (3.50 GHz, Intel Xeon E5-2637 v3)	8	2	4	Intel Xeon E5-2637 v3	3500	457	**57.1**	Sep-14	Inte
9	Cisco Systems	Cisco UCS C240 M4 (Intel Xeon E5-2637 v3 @ 3.50GHz)	8	2	4	Intel Xeon E5-2637 v3	3500	456	**57.0**	Sep-14	Inte
10	Dell Inc.	PowerEdge M630 (Intel Xeon E5-2637 v3, 3.50 GHz)	8	2	4	Intel Xeon E5-2637 v3	3500	456	**57.0**	Dec-14	Inte
11	NEC Corporation	Express5800/GT110g-S (Intel Core i3-4350)	2	1	2	Intel Core i3-4350	3600	114	**57.0**	Jul-14	Inte
12	NEC Corporation	Express5800/T110g-E (Intel Core i3-4350)	2	1	2	Intel Core i3-4350	3600	114	**57.0**	Jul-14	Inte
13	Dell Inc.	PowerEdge FC630 (Intel Xeon E5-2637 v3, 3.50 GHz)	8	2	4	Intel Xeon E5-2637 v3	3500	455	**56.9**	Dec-14	Inte
14	Dell Inc.	PowerEdge R630 (Intel Xeon E5-2637 v3, 3.50 GHz)	8	2	4	Intel Xeon E5-2637 v3	3500	455	**56.9**	Sep-14	Inte
15	Dell Inc.	PowerEdge R730 (Intel Xeon E5-2637 v3, 3.50 GHz)	8	2	4	Intel Xeon E5-2637 v3	3500	455	**56.9**	Sep-14	Inte
16	Hewlett-Packard Comp	ProLiant DL360 Gen9 (3.50 GHz, Intel Xeon E5-2637 v3)	8	2	4	Intel Xeon E5-2637 v3	3500	453	**56.6**	Sep-14	Inte
17	Huawei	Huawei CH121 V3 (Intel Xeon E5-2637 v3)	8	2	4	Intel Xeon E5-2637 v3	3500	452	**56.5**	Sep-14	Inte
18	Huawei	Huawei CH222 V3 (Intel Xeon E5-2637 v3)	8	2	4	Intel Xeon E5-2637 v3	3500	452	**56.5**	Sep-14	Inte
19	Huawei	Huawei RH2288 V3 (Intel Xeon E5-2637 v3)	8	2	4	Intel Xeon E5-2637 v3	3500	452	**56.5**	Sep-14	Inte
20	NEC Corporation	Express5800/T110g-S (Intel Core i3-4350)	2	1	2	Intel Core i3-4350	3600	113	**56.5**	Jul-14	Inte
21	Sugon	Sugon I620-G20 (Intel Xeon E5-2637 v3)	8	2	4	Intel Xeon E5-2637 v3	3500	448	**56.0**	Sep-14	Inte
22	Cisco Systems	Cisco UCS C220 M4 (Intel Xeon E5-2643 v3 @ 3.40GHz)	12	2	6	Intel Xeon E5-2643 v3	3400	671	**55.9**	Sep-14	Inte
23	Dell Inc.	PowerEdge R730 (Intel Xeon E5-2643 v3, 3.40 GHz)	12	2	6	Intel Xeon E5-2643 v3	3400	669	**55.8**	Sep-14	Inte
24	Hewlett-Packard Comp	ProLiant BL460c Gen9 (3.40 GHz, Intel Xeon E5-2643 v3)	12	2	6	Intel Xeon E5-2643 v3	3400	669	**55.8**	Sep-14	Inte
25	Dell Inc.	PowerEdge R630 (Intel Xeon E5-2643 v3, 3.40 GHz)	12	2	6	Intel Xeon E5-2643 v3	3400	668	**55.7**	Sep-14	Inte
26	Dell Inc.	PowerEdge T630 (Intel Xeon E5-2643 v3, 3.40 GHz)	12	2	6	Intel Xeon E5-2643 v3	3400	668	**55.7**	Sep-14	Inte
27	Cisco Systems	Cisco UCS B200 M4 (Intel Xeon E5-2643 v3 @ 3.40GHz)	12	2	6	Intel Xeon E5-2643 v3	3400	667	**55.6**	Sep-14	Inte
28	Dell Inc.	PowerEdge M630 (Intel Xeon E5-2643 v3, 3.40 GHz)	12	2	6	Intel Xeon E5-2643 v3	3400	667	**55.6**	Dec-14	Inte
29	Fujitsu	PRIMERGY RX100 S8, Intel Core i3-4330, 3.50 GHz	2	1	2	Intel Core i3-4330	3500	111	**55.5**	Sep-13	Inte
30	Fujitsu	PRIMERGY RX1330 M1, Intel Core i3-4330, 3.50 GHz	2	1	2	Intel Core i3-4330	3500	111	**55.5**	Jul-14	Inte
31	Fujitsu	PRIMERGY TX1330 M1, Intel Core i3-4330, 3.50 GHz	2	1	2	Intel Core i3-4330	3500	111	**55.5**	Jul-14	Inte
32	Fujitsu	PRIMERGY TX140 S2, Intel Core i3-4330, 3.50 GHz	2	1	2	Intel Core i3-4330	3500	111	**55.5**	Sep-13	Inte
33	IBM Corporation	IBM System x3100 M5 (Intel Xeon E3-1281 v3, 3.70 GHz)	4	1	4	Intel Xeon E3-1281 v3	3700	222	**55.5**	Jun-14	Inte
34	IBM Corporation	IBM System x3250 M5 (Intel Core i3-4330, 3.50 GHz)	2	1	2	Intel Core i3-4330	3500	111	**55.5**	Dec-13	Inte
35	Intel Corporation	ASUS H97M-PLUS Motherboard (Intel Core i3-4360)	2	1	2	Intel Core i3-4360	3700	111	**55.5**	Jun-14	Inte

The Esri CPT makes extensive use of the SPEC performance values to gauge how well an existing or potential hardware platform should perform. Using these performance values in conjunction with defined user workflows provides the CPT with necessary information to properly size a recommended hardware platform to meet the needs of an organization's enterprise GIS.

Platform Performance

The increasingly more powerful hardware platforms that have become available over time, have led to the development of a broad range of powerful software solutions. System processing capacity is important but system availability and scalability even more so for the support and optimal performance of an enterprise GIS.

The processors at the heart of most desktops and servers in use today are Intel based with desktop workstations and servers using the Intel Xeon line of processors. There are some AMD and Sun SPARC processors in use but they only occupy a very small portion of the server technology segment. Following are several processors showing how performance has gained over time:

Processor	Year	Cores	SPEC Rating
Intel Xeon E3-1270v3	2014	4	53
Intel Xeon E3-1280v2	2013	4	48
Intel Xeon E5-2637	2012	4	47
AMD Opteron - best performance	2012	#	22

As seen in the table, the Intel processors have steadily gained in performance while the AMD processor has less than half the performance of the corresponding Intel processor.

Faster processors reduce the processing time of a server or workstation and provide for increased system throughput. It is important to note that ArcGIS Server licensing is based on a per core licensing model (physical and virtual cores are treated the same). By deploying fewer and faster cores, ArcGIS Server licensing costs will be less with minimal loss of performance. Dual and Quad core configurations provide the highest per-core performance. Configurations with more cores, on the other hand, can support more virtual servers in a virtualized environment. The decision on which processor configuration to deploy will be based on cost versus required performance dictated by business requirements.

7

HARDWARE RECOMMENDATIONS

It is being recommended that the GIS Manager continue to work with IT to house all GIS software, databases, and applications. Adequate hardware will be needed to serve the organization. Individual departments are also continually budgeting replacements for older PCs.

Servers

Simi Valley currently has a virtualized server environment comprised of two GIS servers – a primary GIS server and a GIS license server. SQL Server Express is installed on the primary server to support geodatabases. The following are definitions of key terms in regards to ArcGIS for Server:

- **ArcGIS Server Site** – A site refers to the installation of ArcGIS for Server and can consist of a single machine or a composition of several machines.
- **Application Server** - The Application server does the work of responding to requests to the web services. It draws maps, runs tools, queries data, and performs any other action available through a service. The Application server can consist of one machine or many machines working together. The machines all have access to the same data and configuration information, so organizations can easily grow or shrink the number of participating machines in response to demand. The Application server exposes services through the common web protocol HTTP. Supplementing the Application server with an enterprise web server allows for more functionality, such as the ability to host web apps.
- **Cluster** – Clustering involves the logical grouping of servers with the same hardware specifications, but distinctly configured to run a subset of web services. For example, you could

create one cluster to run all your map services and another cluster of servers (perhaps with higher processing power) to run your geoprocessing services.

- **Web Adaptor** - This component provides the functionality needed to integrate the GIS Servers with an enterprise web server. The Web Adaptor receives request and routes them to the GIS Server machines.
- **Web Application Server –** A server used to host the Web Adaptor component of ArcGIS for Server when the installation has been scaled beyond a single server. A Web Server can provide added security and load balancing benefits.
- **Database Server –** This server is used to host SQL Server and the underlying spatial databases.

Server Recommendations

Optimal server configuration for ArcGIS for Server is complex and hinges on many factors. Some of the questions to be asked are as follows:

- What is the total number of simultaneous GIS Users (Internal and External)?
- When will these users come on-line?
- How will this user base scale up or down in the future?
- Are all of the users ArcGIS for Server users or are some of them utilizing ArcGIS for Desktop?
- Is the number of user's total users or anticipated concurrent users? If they are total users, how many concurrent users are expected?
- How many of the users are expected to be internal (using something like an Intranet Viewer) and how many are public? Most likely these different types of users will be treated differently in how many requests they make per minute.
- Is an Esri enterprise licensing agreement (ELA) available for the City? The cost of ArcGIS for Server is significant. Therefore, if no ELA exists then the number of users might have to be controlled based on limitations in funding for ArcGIS for Server.

Following are the Esri minimum specifications for ArcGIS Server:

- 64-bit Operating System – Windows 2008 or later
- 4 GB RAM
- 2 GB Disk Space

Existing Server Technology

The City currently has two production virtual GIS servers in use as follows:

Primary Server

- Two 2.3 GHz Processors
    - 4 vCPUs
- 32 GB Memory
- Windows 2008 R2 Server
- 800GB Disk Storage

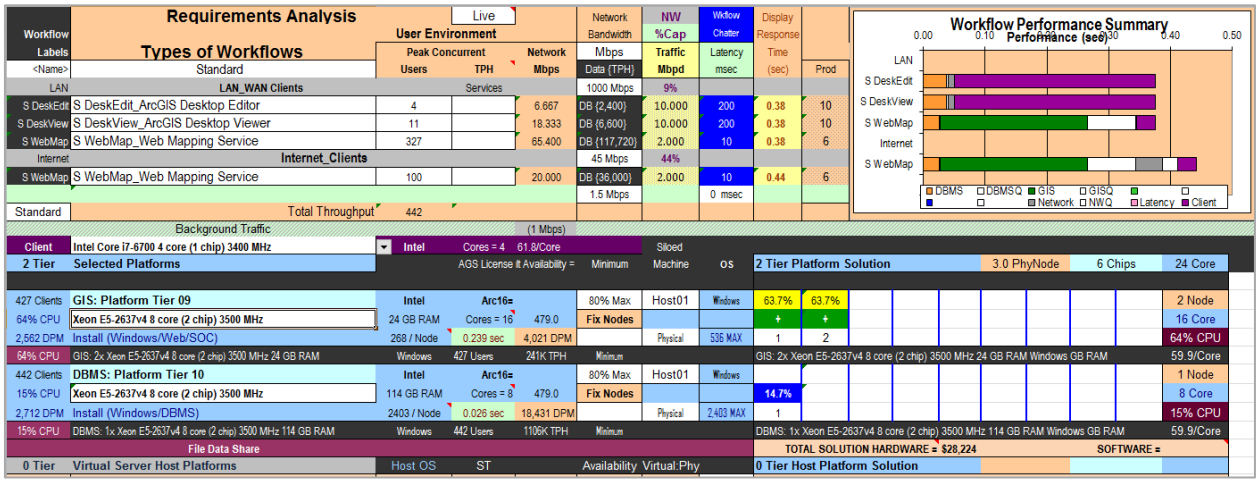
License Server

- One 2.3 GHz Processor
    - 2 vCPUs
- 8 GB Memory
- Windows 2012 R2 Server
- 40GB Disk Storage

Based on the projected growth of the enterprise GIS to 342 internal users and 100 public users, the existing server architecture will not provide the required performance to meet the needs of GIS users. A new server architecture will need to be deployed to meet these growing needs.

Recommended Server Technology

Beyond the minimum specifications and considering the needs and recommendations of this project, Simi Valley should maintain at least the following architecture and modify when necessary. The following recommendations are based on a projected GIS internal user base of 342 (plus 100 public facing users) and results generated and interpreted from the Esri 2016 Capacity Planning Tool (graphic below).



This recommended server platform will provide a significant increase in compute performance and will provide server processing times that are several times faster than the current technology. This configuration is setup for a virtualized environment:

Physical Server:

- Processor: Two - Xeon E5-2637v4 (8 cores / processor)
- Memory: 128 GB
- Local Storage: 2TB Solid State Disk storage in RAID 5 configuration

- **Database Virtual Server** – server containing SQL Server and all spatial databases.
  - **Processor**: 8 vCPUs
  - **Memory**: 128 GB
  - **Local Storage**: 1TB

  Recommended Software:
  - **Windows Server 2012 R2 Standard or Datacenter**
  - **ArcGIS Server 10.3.1 Advanced Enterprise**
  - **ArcGIS Desktop 10.3.1**

- **Application Server** – primary GIS application server that provides map services to desktop and mobile clients.
  - **Processor:** 8 vCPUs
  - **Memory:** 64 GB
  - **Local Storage:** 1TB

  Recommended Software:
  - **Windows Server 2012 R2 Standard or Datacenter**
  - **MS SQL Server 2012 R2 Standard or Enterprise**

- **Web Application Physical Server (Public Facing)** – server inside the DMZ (needs to be accessible to external network request) with ArcGIS Web Adaptor installed. This will allow map/web services/applications hosted on the GIS Server to be published for public use. This includes

services and data that need to be published to ArcGIS Online (for use in mobile deployments, Story Maps, etc.).

- **Processor:** 4 CPUs
- **Memory:** 8 GB
- **Local Storage:** 512 MB

Recommended Software:

- **Windows Server 2012 R2**
- **ArcGIS Web Adaptor**

- **License Manager** – the license manager can be located on any server within the network. Typically, organizations install it on the GIS Application Server.

The above are basic recommendations for a server environment that will support the City's projected use of GIS.

Staging Environment

The City should also consider the development of a staging environment for its GIS server site. The staging tier is an environment that is, as much as possible, identical to the production environment. The purpose of the staging environment is to simulate as much of the production environment as possible. The staging environment can also double as a demonstration/training environment. This environment is often referred to as a testing or sand box environment where all new software, processes, and configurations can first be tested before deploying to a production environment. Virtualized server sites are ideal for deploying a staging environment since new hardware does not need to be purchased and new servers can be deployed and replicated quickly without additional purchasing costs.

Desktop Computer Recommendations

Recommendations are given in this chapter that specify minimum and desired configuration of PCs needed to run GIS software applications. Simi Valley needs to refer to these specifications to see if it will need to upgrade PCs to run specific GIS applications. Specifications will be looked at in two levels:

- **Level 1**: PCs to run robust GIS software such as Esri ArcGIS for Desktop 10.x (Basic, Standard or Advanced)
- **Level 2**: PCs to run ArcGIS for Server client applications, such as an Intranet GIS Data Browsers

There is a difference between a typical PC and a GIS workstation. A typical PC for word processing is not likely appropriately configured for Level 1 GIS use. A GIS workstation demands, at a minimum, a high-end processor, large amounts of RAM (memory), and large disk space.

In the short-term, it is important that all Simi Valley personnel that will utilize Level 1 computers are capable of effectively supporting recommended GIS applications. In the long-term, as more personnel begin to use Level 1 and Level 2 GIS applications, they should have access to computers that can effectively support these applications.

Level 1 PC to Run Basic and Standard

Minimum Configuration

- 2.2 GHz Pentium PC or Greater
- 2 GB of RAM or Greater
- 17" or Greater High Resolution Monitor
- 24x CD-ROM drive or greater
- 80 Gigabyte hard drive or greater
- 100 MBPS Ethernet Card
- 64MB Video RAM or greater with 24-bit capable graphics accelerator

Recommended Configuration

- Core i7 or Xeon Processor
- 8 GB of RAM or Greater
- 19" or Greater High Resolution Monitor
- 8x DVD-ROM Drive or Greater
- 500 Gigabyte Hard Drive or Greater
- Gigabit Ethernet Card
- 2 GB Video RAM or Greater with 24-bit capable graphics accelerator and 3D

Level 1 Workstation to Run Advanced (GIS Power Users)

Recommended Configuration

- Dual – Xeon E5-2630 v3 Processors
- 16 GB of RAM or Greater
- Dual – 24" LED / LCD Monitors
- DVD Burner
- 256 GB Solid State Disk
- 1TB+8GB Hybrid Hard Drive
- Gigabit Ethernet Card
- NVIDIA Quadro K2200 4GB Video Card

Level 2 PC to Run ArcGIS Server End User Applications

Minimum Configuration

- 1GB of Ram or Greater
- 17" Monitor
- 1.6 GHz Processor or Greater
- 100 MB of Unused Disk Space, or Greater
- 100 MBPS Ethernet Card
- 64 MB Video Ram or Greater

Recommended Configuration

- 1 GB of Ram or Greater
- 19" Monitor or Greater
- 2 GHz Processor or Greater
- 100 MB of Unused Disk Space, or Greater
- 100 MBPS Ethernet Card
- 128 MB Video RAM or Greater

The City's existing Tier 1 and Tier 2 GIS users existing desktop computers should be reviewed to ensure that the above minimum specifications are being met.

Field Mobility Recommendations

Currently, several departments within the City have mobile tablets and laptops. Anticipating the growth of mobile data collection at the City, it is important to consider the various options. There are basically four (4) hardware options for accessing GIS data in the field: hand-held computers, notebook computers, tablets, and smartphones. Traditionally, the recommended solution for field access to spatial data has been the use of notebook computers. The primary advantage of hand-held computers has been their small size, which allows for greater portability. The primary disadvantages of hand-held computers are their small-screen size, and limited memory capacity. Notebook computers have much more memory capacity and processing speed than hand-held computers, and also have much larger screens. The advent of tablets and smartphones provides the best of both options: greater portability with increased memory capacity, processing speed and larger screen sizes.

Still, there are considerations that must be addressed when choosing devices for field operations. Ruggedized notebook computers are optimal for field personnel operating in conditions with exposure to weather, dust/dirt, water, and the like. Mounts for notebook computers should be installed in any vehicle that will contain a notebook computer. Mounting computers in vehicles makes them much easier to access and reduces wear on the machine. The mount should not be permanent, however, as notebook computers will need to be taken out of the vehicles by field personnel for special purposed and taken out of the field periodically to update data/software. Ruggedized notebook computers are more expensive than regular notebook computers, but the cost of ruggedized notebook computers is offset by their longevity. A ruggedized notebook computer will outlast a regular notebook by three times. Analysis should be made on the continual cycle of repurchasing damaged or worn notebooks, vs. the initial purchase of a rugged version.

The following is the recommended configuration for notebook computers:

Notebook Computer – Approximate Cost = $4,500

- Ruggedized
- Weigh Less than 5 Pounds
- 1.6 GHz Processor or Greater
- 12 Inch or Greater Anti-Glare Display
- CD-ROM Drive
- 2 GB RAM or Greater
- 80 GB Hard Drive Space or Greater
- 10/100/1000 MBPS Ethernet Card
- Wireless Network Adapter

In contrast, when operating conditions are such that weather and other environmental factors (dust, etc.) and the like are not a major concern, smartphones and tablets become a viable, economical, and user friendly option. As discussed in the software chapter, many applications are available for use on these devices and can assist in making field personnel more efficient by providing them access to GIS data and giving them the capabilities to capture and edit data in the field. Today, the market has many different brands and options available for purchase. However, in general, the options are Android, iOS, or Windows based systems. Simi Valley typically utilizes iOS devices. Each has positives and negatives, but all three can extend the use of GIS into the field. The primary factors driving the determination of which to use involve the application (some applications are only available on certain operating systems (OS)) and the end users (some users prefer smartphones over tablets or are more comfortable with a certain OS). As Simi Valley begins to plan for and deploy mobile GIS applications, they should compare the options available and make the selection based on their needs.

Data Capture Devices – Mapping Grade GPS Receivers

Trimble GPS equipment is ideal for use by utility companies and local government organizations managing assets or mapping critical infrastructure that requires spatial accuracy and data capture. Following are current specifications for consideration on the latest Trimble GeoXH receiver should the City choose to purchase this technology.

Trimble GeoXH 6000 Series – Approximate Cost = $6,000

- H-Star technology for realt-time sub-foot GPS accuracy
- Decimeter accuracy after post-processing
- TI OMAP 3503 processor with 256 MB RAM
- Microsoft Windows Mobile version 6.0 software, allowing maximum flexibility in software choice
- 2 GB onboard data storage plus SD slots for removable storage cards
- High-resolution VGA display
- Bluetooth, WiFi compatible
- GPRS/EDGE cellular modem connectivity
- Rugged handheld with all-day battery
- GNSS capable receiver board (220 channel for GLONASS constellation pickup)
- Field swappable batteries
- Floodlight Shadow Reduction Technology (for receiving satellite data better in urban environments)

Field-mounted GPS receivers will need to be configured and linked, as needed, to the City's computing resources, including computer systems (hand-held computers, notebook/tablet computers, workstations, and servers), networks, and enterprise-wide databases.

The applications for viewing and/or collecting GIS data in the field are another component of the mobile solution. The use of GPS equipment with ArcPad and the use of ArcGIS Online are both suitable mobile GIS mapping solutions with their own strengths and weaknesses. If Simi Valley moves to an ArcGIS Online account, one application to implement is the Esri Collector App. Collector operates through ArcGIS Online and with the newest release allows the ability for working offline. Collector is designed to work with iPhone and Android smartphones, but can also be used on tablets running iOS or Android. Collector is a

simple way to expedite a mobile GIS solution that allows users from across the organization to have the power of GIS in their hands. Collector is included with an ArcGIS Online account, which would eliminate the need for ArcPad.

The following table compares the two mobile solutions:

Field Solution	Live Connection	Disconnected Editing	Horizontal Accuracy	Viewing	Red Lining	Editing
ArcGIS Online Native Application	Yes	Yes- through Collector App	Varies	Yes	Yes	Yes
Handheld GPS - ArcPad	No	Yes	Varies to High	Yes	Yes	Yes

It is common for all of these solutions to be deployed by organizations to meet differing needs of field staff and of the organization. For example, a redlining application running on a tablet computer using ArcGIS Online could potentially meet the needs of one user while another user may need a handheld mapping grade GPS unit to collect large amounts of data in the field (e.g. utilities). The needs of individual users will need to be evaluated and the best mobile solution decided on an individual basis.

Output Device Recommendations

Printers

It is important that the City's GIS users have the means to print maps and documentation generated from these applications. Every GIS user should have access to a high-resolution color printer, to print 8"x11", 11"x17", or 8"x14" maps. In the short-term, each GIS user should have access to at least one networked color printer, even if it is not in their immediate work space. As output demand increases, additional color printers should be purchased for appropriate departments and users.

Plotters

It is important that Level 1 GIS Application users (Advanced, Standard, Basic) have access to wide-format plotters. Many maps must be output onto large sheets to be properly visualized. Numerous departments within the City utilize plotters:

Public Works

- HP T1100ps 44 inch (primary)
- HP DesignJet 800ps 42 inch
- OCE Plotwave 300 scanner/plotter

Environmental Services

- HP DesignJet 800ps 42 inch

Police

- HP DesignJet 800ps 42 inch

These plotters should suffice for the near term. However, as technology changes and the plotters age they should be considered for replacement. Older plotters are in use by Environmental Services and Police and should be considered for replacement with newer technology.

Standard Operating Procedures (SOP)

The development of clear and concise Standard Operating Procedures to fully document all major technology and GIS functions is critical to the success of the enterprise GIS and can include the following topics:

- Data Maintenance
- ArcGIS Versioning
- Active Directory
- Database Permissions and Security
- ArcGIS Server User Authentication
- Quality Assurance / Quality Control

These SOP documents should be heavily documented and contain step-by-step directions with numerous graphics guiding the user through each step of a given procedure. Ease of use, clear and concise steps, and thorough documentation should be the standard for these SOPs. The following six-step procedure should be used when developing the SOPs.

1. Name the SOP using descriptive action words. For example, “Performing Data Maintenance”, “Configuring Permissions and Security using Active Directory”, etc.
2. Write a scope for the SOP answering the following questions:

    a. Which specific procedures will be covered?
    b. Which procedures are not covered?
    c. Who is the target audience for the SOP?
3. Develop the overall task description and include staff required for the task, what software (licensing) is needed, and the required staff skill level.
4. Describe each task in detail and include:
    a. Specific order of tasks
    b. Required software
    c. References to other SOPs
5. Use a team-based approach to developing SOPs. Successful SOP development and implementation typically requires that all people who are affected by a SOP be involved in a team-based SOP development and problem solving process. To achieve that:
    - Key City staff will need to be involved in drafting the initial SOP
    - Key City staff will need to check the written procedures against actual practices before implementation.
    - Revise as needed
6. Establish a process to monitor the SOPs regularly. This will ensure that if procedures change over time, the SOPs will be maintained and updated to reflect the change in procedures.

It is important to realize that developing useful and effective SOPs requires time and commitment from all management and employee levels. Once the SOP development is complete, three important steps still remain.

1. Educate employees about the new SOP
2. Control “procedural drift” by ensuring that the SOP is followed consistently over time
3. Establish an evaluation and review system to be certain that over time all the steps of an SOP are still correct and appropriate for the production system

TRAINING & EDUCATION

CITY OF SIMI VALLEY

CALIFORNIA

GIS ASSESSMENT AND REVITALIZATION PLAN

SECTION OUTLINE

1 INTRODUCTION

Improving the GIS knowledge base within each City department will be the final goal of the training and education section of the strategic plan. A developed a training, education, and knowledge transfer plan will encourage the effective utilization of GIS technology.

Task #1: GOVERNANCE MODEL – Implement a centralized hybrid governance model that promotes ongoing training and education.

Task #2: SOFTWARE TRAINING – Provide software GIS training and educational opportunities to all City staff on a regular basis. Utilize Esri's Online Education and Training services through the existing licensing agreement. Provide formal classroom training for identified departmental staff – including Desktop, Intranet, Internet, Mobile, GPS, ArcGIS Online and Story Maps, and Extensions.

Task #3: KNOWLEDGE TRANSFER – Establish a GIS user group network within the organization to help facilitate growth. Establish quarterly GIS meetings.

Task #4: FORMAL ON-GOING TRAINING PLAN --Implement a formal sustainable GIS Training Plan.

Task #5: MOBILE TRAINING – As part of the formal training plan, develop a strategy for the effective use and training of mobile field devices.

Task #6: CONFERENCES – Attend workshops and pre-conference seminars at the Esri International Users Conference and regional Esri California Area Conferences.

Task #7: ONLINE SEMINARS AND WORKSHOPS – Use all available online training, education, and knowledge transfer workshops.

Task #8: BROWN BAG LUNCHES – The GIS Team should offer seminars and workshops tailored to specific departmental applications of GIS.

Task #9: DEPARTMENTAL SPECIFIC TRAINING – Promote departmental specific GIS training.

Encourage and promote targeted GIS training, including:

1. General Executive Management Workshop
2. Public Safety GIS Workshop
3. Public Works and Land Management GIS Workshop
4. The ROI of GIS in City Government

GIS TRAINING MODEL

Training will be an integral part of the City's continuing GIS implementation strategy and should revolve around a model that includes external training, internal training, and continuing education offerings. The training model should follow the same tiers of GIS users as outlined in previous chapters:

- A Tier 1 user is a Flagship GIS user who has access to a fully functioning GIS toolset including editing and complex analysis. Tier 1 users are those that use the entire ArcGIS suite, GIS data managers, and/or career GIS professionals.

- A Tier 2 Analytical user focuses on data analysis, in addition to general browsing capabilities. Tier 2 users conduct analytical tasks above and beyond what is offered at the Tier 3 level. They need a tool that allows for robust flexibility and a host of analytical tools such as provided by ArcGIS Desktop Basic.

- A Tier 3 Browser user requires only general browsing, simple cartographic output and basic GIS data query functions. Generally, Tier 3 users can have the majority of their GIS needs met by Internet and/or Intranet browser based map applications.

The GIS Team will play a prominent role in the training model. In addition to enhancing their own technical skills, it is recommended that the GIS Manager and his future team (hereafter referred to as GIS Team) is proficient in GIS training to a degree that they are able to carry on training with other City employees. Discussed later in this section, the GIS Team should use a "train the trainer" model to propagate their GIS skills to other City GIS users.

ArcGIS Training Recommendations

Numerous training courses are available via Esri's Virtual Campus free of charge. Esri recently made all virtual campus courses free to the public. This should be taken advantage of by Simi Valley staff. Free courses such as "Exploring GIS Maps" "Evaluate Locations for Mixed-Use Development" "Monitor Real-Time Emergencies" and "Mapping the Public Garden" would give even Tier 3 Users a good foundation on some of the tools staff would be utilizing.

It is important to note that the following recommendations do not account for existing expertise. For example, staff with a GIS diploma or equivalent knowledge may not need some of these courses. Additionally, staff may have already taken classes or achieved a level of expertise on certain software products or functions precluding their need for certain classes. However, the following is a holistic look at what is needed. If a person already has the needed expertise they do not need to take the class unless they desire a refresher.

Tier 1 users – those GIS users responsible for the creation/maintenance of GIS databases – should take ArcGIS classes (ArcGIS II and ArcGIS III). These ArcGIS classes teach functionality, tools, workflows, and analysis for ArcGIS Desktop (Advanced, Standard, and Basic editions). ArcGIS II and ArcGIS III classes can be provided on-site by Esri or Esri Authorized Instructors. In addition to the ArcGIS class, Tier 1 GIS users that will have technical responsibilities with ArcGIS Server should also take the ArcGIS for Server "Sharing GIS Content on the Web" and "Building Geodatabases" classes. Members of the core GIS Team should also take "Configuring and Managing the Multiuser Geodatabase" and "ArcGIS for Server: Site Configuration and Administration" to understand the use and storage of data in the ArcSDE environment. It is expected that 4 staff will need to take these courses.

Tier 2 users should be provided, at a minimum, with the multi-day ArcGIS II training class. This will include an introduction to the base functionality and tools of the software, from data management to desktop level analysis. Additionally, Tier 2 users should also take the ArcGIS III class. Staff noted it would be more convenient for staff to travel to the Esri headquarters in Redlands, CA for this training, rather than hire an Esri Authorized Instructor to teach ArcGIS II on-site. It would be most cost efficient for the City to use a City staff member to conduct these trainings in house. It is expected that 11 staff will need to take these courses.

Tier 3 users will receive customized training sessions on each individual end-user application that is developed. These applications are generally very intuitive and user-friendly with integrated contextual help. Half-day training sessions on each application will be sufficient. This training can be delivered through existing staff in an effort to achieve cost savings. It is expected that 247 staff will need to take these courses.

City of Simi Valley Training Alternatives

GIS training is mission-critical to the success of GIS within the City and there are many alternatives for GIS training. Esri offers a host of GIS classes and has a training center in Redlands, CA, and numerous low-cost and free self-paced courses available on-line. Additionally, there are other locations for Esri training. Certified Esri class locations can be found at: https://www.esri.com/training/instructor-led/locations/. There are local colleges that offer courses as well as books and other media forms of training. Esri courses are changed on a yearly or bi-yearly basis, depending on versioning, and offerings should be reevaluated regularly.

In considering the City's long term training needs, it would be very beneficial and cost effective to have the City's GIS staff conduct the City's GIS basic training. To accomplish this, GTG recommends that the GIS Manager and other key staff conduct internal GIS training.

In the past, Esri has offered an Authorized Trainer Program (ATP). This allowed non-Esri employees to become certified Esri trainers and would give them access to Esri training materials and order training books. However, in 2011 Esri discontinued to their Certified Training Professional (CTP) program. Due to the cost of training programs, combined with the increasing volume of training needed by the City, it is recommended that the GIS Manager be considered a trainer (non-Esri certified) for the City.

The GIS Manager and/or his staff should take the Esri courses pertinent to the classes for which she will teach. They then should tailor a course to the City's GIS end-users. Esri courses cover a wide range of topics, some of which are not pertinent to City of Simi Valley's GIS users. Therefore, the GIS Manager or his staff should customize each in-house course to focus on relevant topics tailored to the needs of the City's GIS end-user community. These classes need not be the same duration as the Esri courses as the City's training material should be more concise and targeted.

2

PROJECTED GIS SOFTWARE

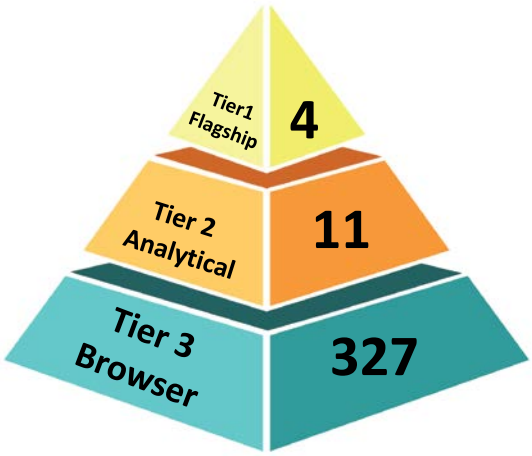
TIER-LEVEL USERS BY DEPARTMENT

The following table summarizes the recommended GIS Software Tier-Level Users by Department based on the needs assessments. This table provides a snapshot of the level of training that will be necessary per each Department.

Projected GIS Software Tier-Level Users by Department				
City of Simi Valley Departments/Divisions	Tier 1 Flagship Users	Tier 2 Analytical Users	Tier 3 Browser Users	Total Projected GIS Users
City Manager's Office	0	0	6	6
Customer Services	0	0	3	3
Administrative Services	0	0	2	2
Community Services	0	2	11	13
Environmental Services	1	3	25	29
Public Works	3	3	20	106
Police Department	0	3	180	183
Total	**4**	**11**	**327**	**342**

TIER-LEVEL TRAINING SUMMARY

The following pyramid summarizes the total number of users needing training based on tiers of GIS use. The table on the right describes typical GIS activities by level of user.



TIERS OF GIS USERS	
GROUP	**ACTIVITY**
Tier 1 Flagship	• GIS Administration • Data Maintenance • Data Conversion and Creation • Spatial Data Management • Technical Support • Coordination
Tier 2 Analytical	• Data Maintenance • Analytical Functions/Geoprocessing • Complex Queries • Modeling • Use of Desktop Extensions • High Quality Map Production
Tier 3 Browser	• Browsing/Look-Up • Standard Reports • Simple Query • Map Production

3

GIS TRAINING MATRIX

Several Esri courses have been identified which would be of benefit to continued GIS growth and professional development.

The following table summarizes the recommended training class regimen for the City. The table includes the class, trainer, course length, recommended participants, and initial offering plan year.

Class	Site	Trainer	Days	Year of Training – Based on this five-year plan	Recommended Participants
ArcGIS I: Introduction to GIS (10.x)	On	Esri	2	1,3,5	Tier Two GIS Users
ArcGIS II: Essential Workflows	On	Esri Authorized Trainer	3	1,3,5	Tier One and Two GIS Users
ArcGIS III: Performing Analysis (10.x)	On	Esri Authorized Trainer	2	1,3,5	Tier One and select Tier Two GIS Users
Building Geodatabases	Off	Esri	3	1,4	Tier One and Two GIS Users
Creating and Maintaining Metadata in ArcGIS	On	Web Course	3 Modules Self-Paced	1,4	Tier One and Two GIS Users
Deploying and Maintaining a Multiuser Geodatabase	Off	Esri	2	1	Tier One and select Tier Two GIS Users
System Architecture Design Strategies	Off	Esri	3	1	GIS Manager
ArcGIS for Server: Site Configuration and Administration	Off	Esri	3	1,4	GIS Manager
ArcGIS 4: Sharing Content on the Web	Off	Esri	3	1	GIS Manager
Tier 3 Applications	On	Internal	1	1,2,3,4,5	Various

4

GIS TRAINING OFFERINGS PLAN PER YEAR

The following table lists the recommended training class and recommended number of classes per plan year. After year 5, classes should be provided on an as-needed basis with an eye on staff turnover and/or new releases of technology.

Class	FYI	FY2	FY3	FY4	FY5
ArcGIS Training Classes					
ArcGIS I: Introduction to GIS (10.x)	1	0	1	0	1
ArcGIS II: Essential Workflows	1	0	1	0	1
ArcGIS III: Performing Analysis (10.x)	1	0	1	0	1
Building Geodatabases	1	0	0	1	0
Creating and Maintaining Metadata Using ArcGIS	1	0	0	1	0
Deploying and Maintaining a Multiuser Geodatabase	1	0	0	0	0
System Architecture Design Strategies	1	0	0	0	0
ArcGIS for Server: Site Configuration and Administration	1	0	0	1	0
ArcGIS 4: Sharing Content on the Web	1	0	0	0	0
Tier 3 Applications					
Tier 3 Applications	1	1	1	1	1

5
ADDITIONAL TRAINING

Following are additional training courses which would be of benefit to continued GIS growth and professional development to the City's GIS users.

Class	Site	Trainer	Days	Years of Training – based on this five-year plan	Participants
Introduction to Geoprocessing Scripts Using Python	On	Esri	3	1	Various
Implementing Versioned Workflows in a Multiuser Geodatabase (10.x)	Off	Esri	3	1	Various
Developing Web Apps with ArcGIS API for JavaScript	On	Esri	3	1	Various
Exploring Enterprise GIS: A Workshop for Leaders	On	Esri	3	1	Various

The following table lists all of the recommended training courses along with user tier and prerequisites. Comments are provided that give a brief description of course contents. Detailed course descriptions can be found after this table. The courses are listed in a logical flow and recommended sequence.

Class	GIS Manager	Tier 1	Tier 2	Tier 3	Suggested Prerequisites	Comments
ArcGIS I: Introduction to GIS		●	●	●	None	Basic level ArcGIS course teaching how to create maps, analyze data, and how to use various tools.
ArcGIS II: Essential Workflows		●	●		ArcGIS I: Introduction to GIS	Builds on content learned in ArcGIS I and adds training on how to author, share, and use geographic information in ArcGIS.

Class	GIS Manager	Tier 1	Tier 2	Tier 3	Suggested Prerequisites	Comments
ArcGIS III: Performing Analysis		●	●		ArcGIS II: Essential Workflows	Building on ArcGIS I & II, learn how to efficiently solve spatial problems to support informed decision making.
Building Geodatabases		●	●		ArcGIS I: Introduction to GIS	Learn how to build geodatabases, add data, and model real world relationships.
Creating and Maintaining Metadata Using ArcGIS		●	●		ArcGIS I: Introduction to GIS	Learn how to properly create and maintain metadata.
Deploying and Managing a Multiuser Geodatabase	●				ArcGIS II: Essential Workflows	Course prepares you to successfully deploy a multiuser geodatabase to manage critical geographic assets including architecture, configuration, assigning user privileges and performing maintenance.
System Architecture Design Strategies	●				Review: www.esri.com/systemdesign	Covers GIS system architecture design strategies. Learn how to plan and select the right system architecture for your organization.
ArcGIS for Server: Site Configuration and Administration	●				ArcGIS II: Essential Workflows	Learn how to install, configure, and manage an ArcGIS for Server system.
ArcGIS 4: Sharing Content on the Web	●				Introduction to ArcGIS Server	Learn how to publish professional map services that will provide spatial data to colleagues and non-GIS audiences.
Tier 3 Applications		●	●	●	None	Learn the basic capabilities and tools of the intranet/Internet/mobile applications.

TRAINING CLASSES – TIER 1 AND TIER 2

The following are the classes recommended for the City of Simi Valley staff. Some classes in the Tier 1 level may coincide with classes recommended for staff classified in the Tier 2 level. These classes are noted.

ArcGIS I: Introduction to GIS

Recommended Attendees

All Tier 1 and 2 users

Overview

This course introduces GIS concepts and ArcGIS tools used to visualize real-world features discover patterns and communicate information. Using ArcMap and ArcGIS Online, you will work with GIS maps, explore data, and analyze maps and data as you learn fundamental concepts that underlie GIS technology.

Audience:

Individuals who do not have any prior GIS education or workplace experience with GIS.

Goals:

- Quickly create and share a GIS map using ArcGIS web-based tools and content.
- Find and organize geographic data and other GIS resources for a mapping project.
- Accurately display features on a GIS map and efficiently access information about them.
- Perform spatial analysis to answer questions.

Course Length

Two Days

Course Cost

$1,130 per student. Reduced rates may apply for onsite training.

Recommended Instructor\Location

City of Simi Valley Trainer, On-site or Consultant

ArcGIS II: Essential Workflows

Recommended Attendees

All Tier 1 and select Tier 2 users

Overview

In this course, you will acquire fundamental skills to perform the most common ArcGIS workflows. Primarily using ArcMap, you will explore, manage, and analyze geographic data and create informative maps. Learn techniques to effectively share GIS maps and resources with decision makers, colleagues, and the public.

Audience:

GIS professionals and others who have an introductory-level knowledge of GIS concepts and limited ArcGIS experience.

Goals:

- Organize create and edit geographic data.
- Manage, symbolize and label map layers.
- Analyze GIS data and solve spatial problems.
- Share maps and analyze results.

Course Length

Three Days

Course Cost

$1,695 per student. Reduced rates may apply for onsite training.

Recommended Instructor\Location

City of Simi Valley Trainer, On-site, or Consultant

ArcGIS III: Performing Analysis

Recommended Attendees

All Tier 1 Users and select Tier 2 Users doing day-to-day data editing

Overview:

Learn a standard workflow you can apply to any spatial analysis project. You will perform different types of analyses to efficiently create reliable results that support informed decision making. Tools utilized include ArcMap, Spatial Analyst Extension.

Audience:

GIS analysts, GIS technical leads.

Goals:

- Automate analysis tasks using geoprocessing models.
- Create a weighted suitability model to select the optimal location for a new site.
- Apply spatial statistics to examine distribution patterns and identify hot spots.
- Model temporal data to analyze and visualize change over time.

Course Length

Two Days

Course Cost - $1,130 per student. Reduced rates may apply for onsite training.

Prerequisites

ArcGIS II: Performing Analysis

Recommended Instructor\Location

City of Simi Valley Trainer, On-site, or Consultant

Building Geodatabases

Recommended Attendees

Select Tier 1 and select Tier 2 users

Overview:

This course teaches the essential concepts and skills needed to efficiently create a geodatabase, add data to it, and model the real-world spatial relationships inherent to your data. You will learn about unique geodatabase features that help ensure data integrity of your GIS data over time. Course concepts apply to file-based and multiuser ArcSDE geodatabases. This course is taught using ArcGIS for Desktop Advanced.

Audience:

Data Editors, GIS Technical Leads, GIS Database Designers, Database Administrators

Goals:

- Organize geodatabase data for display and editing
- Add rules and behaviors to ensure the spatial and attribute integrity of geographic data
- Use a template data model for geodatabase design
- Create geodata service to share a geodatabase with desktop, web, and mobile users.

Course Length – 3 days

Course Cost

$1,695 per student. Reduced rates may apply for onsite training.

Recommended Instructor\Location

City of Simi Valley Trainer, On-site, or Consultant

Creating and Maintaining Metadata Using ArcGIS

Recommended Attendees

GIS Team who then train internal staff

Overview:

Metadata, helps you find, evaluate, organize, and share spatial data and related GIS content. This course discusses the different styles of metadata used in ArcGIS. You will learn the steps to create update and maintain metadata that meets individual project needs and organizational standards.

Audience:

GIS Technical Leads, GIS Database Designers

Goals:

- Identify required fields for metadata standards.
- Import and export metadata
- Support data searches with tax and thumbnail graphics

Course Length

3 Modules

Course Cost

Depends on Subscription

Recommended Instructor\Location

Web Course

Deploying and Maintaining a Multiuser Geodatabase

Recommended Attendees

GIS Manager

Overview:

This course prepares you to successfully deploy a multiuser geodatabase to manage your organization's geographic data assets. You will learn about the multiuser geodatabase architecture and installation options, and how to configure the geodatabase for efficient data storage and delivery of data access and editing capabilities to many users. Although course exercises use the enterprise geodatabase, many course concepts also apply to workgroup geodatabases.

Audience:

GIS Technical Leads, GIS Database Designers, Database Administrators

Goals:

- Install ArcSDE technology and configure it for your relational database management system.
- Load and update data in a multiuser geodatabase.
- Set up user roles and permissions to provide secure data access.
- Apply best practices to optimize geodatabase performance.

Course Length

Two Days

Course Cost

$1,130 per student.

Recommended Instructor\Location

Web Course

System Architecture Design Strategies

Recommended Attendees

GIS Manager

Overview:

This course covers GIS system architecture design strategies and infrastructure architecture patterns that support successful enterprise operations. You will learn comprehensive guidelines for planning and selecting the right system solution to meet your organization's needs. This course also covers performance validation and system capacity planning techniques for enterprise GIS deployments.

Audience:

GIS Technical Leads, System Administrators, GIS Managers

Goals:

- Define user workflow requirements and software deployment patterns.
- Recognize system design factors that impact GIS software performance and scalability.
- Incorporate best practices throughout system design and deployment.
- Identify a target IT platform and network solution that satisfies your peak system performance needs.

Course Length

Three Days

Course Cost

$1,695 per student. Reduced rates may apply for onsite training.

Recommended Instructor\Location

Esri, Off-site

ArcGIS for Server: Site Configuration and Administration

Recommended Attendees

GIS Manager

Overview

In this course students will learn how to successfully install, configure, and manage an ArcGIS Server system that enables the sharing of GIS content across the enterprise. The ArcGIS Server architecture will be learned and recommended workflows will be taught for the configuration of ArcGIS Server sites. Best practices for system performance and security are emphasized.

Audience:

System and Web Administrators.

Goals:

- Integrate your ArcGIS Server with a web server.
- Plan, create, and update a cache for high-performing map and image services.
- Tune and monitor services to ensure high performance.
- Implement security for your site and services that meets the needs of your organization.

Course Length

Three Days

Course Cost

$1,695 per student. Reduced rates may apply for onsite training.

Recommended Instructor\Location

Web Course

ArcGIS 4: Sharing GIS Content on the Web

Recommended Attendees

GIS Manager

Overview:

This course teaches how to deliver geographic information so that it can be effectively used by colleagues, decision-makers, and non-GIS audiences. You will learn how to share your professional maps, data, and workflows by creating and publishing high-performing GIS services that can be accessed from desktop computers, web browsers, and mobile devices.

Audience:

- GIS analysts, specialists, and other experienced ArcGIS users who want to share GIS resources in web maps and web-mapping applications.
- Developers who want to incorporate GIS services and web maps into custom applications.

Goals:

- Determine which sharing option is appropriate for your needs.
- Author and publish map services to share your authoritative GIS data.
- Share GIS resources as stand-alone services and in web maps and web-mapping applications.

Course Length

Three Days

Course Cost

$1,695 per student. Reduced rates may apply for onsite training.

Recommended Instructor\Location

Esri, Off-site

TRAINING CLASSES – TIER 3

Tier 3 users will need training specific to the GIS Intranet Data Browser, Mobile and/or Field applications, dashboards, and other browser and analytical based applications. These training classes can be handled on-site on an as needed basis by the GIS Manager and/or selected consultants. The cost of all Tier 3 applications includes training for selected personnel. Enterprise-wide training of Tier 3 applications can be conducted by GIS Analysts or other technical staff person.

6
CONTINUING EDUCATION

An important part of professional GIS education is not only formal training classes, but also attending GIS conferences, being active in professional organizations, and joining area or regional user groups.

In addition to their regional and national users' conferences, GIS professional associations offer important peer-to-peer connections, professional journals and technical publications, training and other learning forums, and opportunities to form local, regional and national policy by serving on select committees and special interest groups. The two largest and best known professional GIS associations are:

- **Geospatial Information Technology Association** (GITA) – is the professional association and leading advocate for anyone using geospatial technology to help operate, maintain, and protect the infrastructure, which includes organizations such as utilities, telecommunication companies, and the public sector. Through industry-leading conferences—along with research initiatives, chapters, membership, and other programs—GITA provides education and professional best practices. (See www.gita.org for more information.)
- **Urban and Regional Information Systems Association** (URISA) – is a multidisciplinary association where professionals from all parts of the spatial data community come together to share concerns and ideas. URISA strives to provide exceptional educational experiences, a vibrant and connected community, and the essential resources needed for a successful career. (See www.urisa.org for more information.)

GIS conferences allow registrants to attend workshops and seminars (some free, some at additional cost), and to interact with other GIS professionals from around the region, state, country, and world. The City of Simi Valley should budget every year for conference attendance. The International Esri User Conference is the premier GIS learning experience and should be attended if possible.

Important conferences that should be attended by City of Simi Valley staff (at the GIS Manager's discretion, and within budgetary limitations) include:

Esri International User Conference, San Diego, California

http://www.esri.com/events/index.html

Who Should Attend?

The Esri User Conference is open to all Esri software users including:

• **New Users**	• **Experienced Users**
• **User Group Members**	• Supervisors
• **Programmers**	• Specialists
• **Analysts**	• Technicians
• **Local, Regional, National, and International Committee Members**	• Management Information Services and Industry Solutions Supervisors
• **Project Coordinators**	• Department Heads
• **Division Chiefs**	• Executive Directors
• **Faculty**	• Elected Officials
• **Board Members**	• Chairpersons
• **NGO Representatives**	• First Responders

Why Attend

- Find out everything you need to know about ArcGIS 10.x, from productivity and sharing to spatial analysis and imagery.
- See how to best leverage your current GIS investments.
- Learn from people like you who are tackling challenges like your own.
- Get updates and direction that will help your organization make better decisions.
- Gain tips, tricks, and tools to launch, update, and enhance your GIS projects.

- Connect with Esri staff including product and industry specialists, instructors, and the technical support experts.
- Hear straight from Jack Dangermond, Esri President.
- Be part of an inspired global community striving to design a better world.

Urban and Regional Information Systems Association (URISA)

http://www.urisa.org/education-events/gis-pro-annual-conference/

The URISA Annual Conference offers a unique multidisciplinary approach, with sessions led by industry leaders, powerful keynote presentations, panels, roundtable discussions and networking meetings you won't find anywhere else.

This conference is vital to professionals concerned with the effective application of management information services in all state and local government agencies, including:

- Community & Economic Development
- Emergency Services/Public Safety
- Environmental Management
- Land Records
- Public Works
- Tax Assessment
- Transportation Planning
- Urban Planning & Design
- Utilities

7
COMMUNICATION PLAN

Education is as important as formal training. GIS must be understood and the organization must be educated as to the benefits and uses of GIS technology. This can be accomplished through several methods. The City of Simi Valley must make a conscious effort to continually educate the organization. Therefore, it is important to have a communication/education plan. The purpose of a communication plan is to help an organization communicate with internal and external audiences. It is critical that GIS is communicated in an organized and deliberate fashion at the City. Some of the reasons for the City to communicate regarding GIS are as follows:

- Keep stakeholders informed about City GIS activities
- Provide ongoing project updates
- Distribute major reports and findings
- Educate GIS users as to approved standards
- Educate people about the benefits of GIS
- Make people aware of the City's GIS activities and the impact they are having
- Solicit and acquire input related to City GIS activities
- Understand the needs of the GIS user community
- Provide sound policy advice to decision makers
- Promote programs that the City thinks are critical to sound GIS development
- Promote the use of GIS in meeting objectives of key stakeholders

This communication plan is meant as a guide for the City's GIS development efforts. It describes the audiences that should be hearing from the City and ways to reach them. Additionally, it talks about ways for getting feedback as well as receiving communication from key audiences. The City should

incorporate numerous ways to communicate with its audience. Following are the audiences that would typically be included in the communications plan:

- GIS Users Group –users that need to be kept in the loop on pertinent City directed GIS activities
- City Leaders – decision makers need to understand GIS and why it is being used
- General Public – typically peripherally aware of technology; need events and stories in the media to better inform
- Local and Regional Governments – potential users of the City's GIS; need to educate on what the City has to offer
- Surveyors – could support improving accuracy standards and modernization of data

COMMUNICATION METHOD

Various methods exist that will allow the City to communicate its GIS message both internally and externally. Some methods, like email, brochures, newsletters, City web site, and council meetings, are always available and easily accessible. Other methods require significant effort and cost to create and distribute. These include publication articles, annual reports, participation at GIS conferences, and developing or updating strategic plans. The City will need to review the various communication methods available and decide which methods would best suit its needs. The following is a bulleted list of suggested communication methods, their frequency and costs:

- GIS Steering Committee
    - Should meet quarterly at a minimum
    - Serves to keep decision makers informed and guide GIS implementation and priorities
    - Cost- $0
- GIS User's Group
    - Should meet quarterly at a minimum
    - Serves to keep GIS users apprised of technology changes, city standards, and GIS direction
    - Cost - $0
- GIS Day
    - November of every year

    - Opportunity to share GIS successes with the organization and public
    - Nominal cost – booth and various displays
    - Should participate and promote each year
- Annual User Satisfaction Survey and Report (refer to the Voice of the Customer chapter)
    - January of each year
    - Users should be given an anonymous survey that allows them to give candid feedback as to how well GIS is meeting their needs
    - Data should be compiled in a report and shared with the City
    - Cost- $0
- Annual Strategic Plan Update
    - March of each year
    - The strategic plan should be a living document. It should identify successes, changes in technology, and reprioritize GIS needs/expenditures each year.
- One-on-one Meetings
    - Monthly
    - The GIS Manager should meet one-on-one with key decision makers each month to apprize them on how GIS is progressing to meet their needs. Also, this is a great way to educate decision makers on other ways their department can use the technology.
    - Cost - $0
- Presentations to City Council
    - Annually
    - High level presentation to Council detailing how GIS is improving the City and expanding services
    - Cost - $0
- Blogs, email, and social media
    - As pertinent
    - GIS staff should establish a number of conduits for disseminating pertinent information, sharing ideas, and making announcement. Various digital mediums should be leveraged for this. Internal and external customers should be provided with various information conduits.
    - Cost - $0

- Newspapers and television
    - As pertinent but at least once a year
    - GIS staff should leverage the press. As exciting projects are completed, the story should be shared with media outlets. In most cases, they are looking for interesting stories and will gladly work with the City to publicize GIS successes.
    - Cost - $0
- Brochures, newsletters, and other marketing efforts
    - Throughout the year
    - GIS staff should make an effort to market successes and services. Brochures describing what GIS services, newsletters, the City web site, and other methods should be used to promote GIS throughout the City
    - Cost - $0 unless a professional firm is used to create an identity or brochure
- Seminars
    - Throughout the year
    - Formal software training is needed. However, these should be augmented with seminars that discuss GIS in a broader context. Seminars such as a GIS Manager's Workshop or Return-on-Investment with GIS are great ways to share how GIS can benefit an organization. These can be conducted by internal staff. However, a budget should exist to bring in outside speakers for key topics.
    - Cost - $5,000 annually

SUCCESSION PLANNING

One key part of communication and knowledge transfer that is frequently overlooked is succession planning. When key personnel retire, or leave the organization, the information they had accumulated during the time with the organization leaves as well. With only 4 Tier 1 Users recommended, Simi Valley needs to make sure there is succession planning so that when individuals leave the organization, the GIS training they had acquired is passed to other individuals.

CONCLUSION

As the City continues to develop and grow its enterprise GIS, it is becoming increasingly necessary that strong and consistent communications are maintained with all GIS stakeholders internally and externally. The implementation of a pervasive communication plan will help to establish and formalize those lines of communications which in the long run, will help the City further improve the enterprise GIS while providing maximum value to its stakeholders.

FIVE YEAR TACTICAL PLAN

CITY OF SIMI VALLEY

CALIFORNIA

GIS ASSESSMENT AND REVITALIZATION PLAN

SECTION OUTLINE

1 INTRODUCTION

This chapter focuses on a tactical plan of action for implementing the key elements that have been identified and detailed throughout this plan. A tactical plan refers to a plan of action designed to identify a series of maneuvers or stratagems for obtaining a specific goal or result. In this case, the desired result is to utilize GIS as an enterprise-wide tool which enables staff to more effectively and efficiently serve the citizens of the City of Simi Valley.

This chapter defines the necessary tasks and procedures for the City of Simi Valley to plan and implement the recommendations outlined in this report. This five-year phased tactical plan, if implemented, will provide the City of Simi Valley with a cost effective solution that allows the City to further utilize GIS in an enterprise-wide fashion.

2
FIVE YEAR TACTICAL PLAN

The table beginning on page 11 documents all of the tactical elements needed to further implement enterprise-wide GIS over a five-year period. Initially the efforts will be focused on governance and data normalization efforts. Next, the focus is on the expansion of the user base with Internet, Intranet, and targeted applications. An early primary objective is to gain several "quick successes" in terms of application implementation, data development and integration, data maintenance procedures, and education. It is important to note that these recommendations are predicated on the adoption of this plan and the adoption of the recommended governance strategy during the first year of this project. There are a number of data layers identified in this plan. Some layers like parcels, address points, and centerlines (maintained by the Central GIS Staff in Public Works) are a city-wide resource, while other layers are specific to individual departments. Layers that do not exist or are in need of refinement should be created internally or through outsourcing as funding will accommodate.

TACTICAL PLAN

The following tactical plan identifies each activity and expense that has been identified in the strategic plan. Each activity is divided into descriptive columns as follows:

Task – a descriptive title of the item

Department – the department that was identified to have a need for the item

Task Type

- OT = one-time non-repeating task
- MT = task that will be repeated multiple times
- OG = task that is on-going
- D = department/division task funded by the departments as needed

Notes – comments and/or notes about the item

Year 1 – 5 Costs – cost approximation of the item. Some items have numbers that are exact. Others will depend heavily on what type of technology is used to implement them. Some will require an RFP to determine the actual cost, although a best estimate has been given based on industry knowledge.

Tactical Plan Tasks

The following are each of the tactical plan tasks by major category, a brief description, and any task dependencies.

 Denotes a task with dependency.

 Denotes an official decision point.

<u>Category 1 - Governance</u>

- **GIS Steering Committee Establishment and Guidance** –  GIS Steering Committee should be officially established based on recommendations beginning on page 31 of the Governance Chapter. GIS Steering Committee will guide GIS priorities. See Governance Model Chapter page 31.
- **Official Adoption of Governance Strategy** – Adoption of the governance strategy by the GIS Steering Committee to include final location of GIS Team.  *GIS Steering Committee Quarterly Meetings*
- **Official Adoption of Implementation Plan** - Adoption of the implementation plan by the GIS Steering Committee.  *GIS Steering Committee Quarterly Meetings*
- **Adopt and Formalize a Centralized/Hybrid Model –** Formalize how the organization operates regarding GIS. Define roles and responsibilities of GIS Team and the various divisions/departments.  *GIS Steering Committee Quarterly Meetings*
- **Change the GIS Coordinator Title and Job Duties to that of a GIS Manager** – GIS Manager position change outlined on page 33 of Governance Chapter.
- **Hire GIS Analysts –** Over 200 needs have been identified in this plan. To achieve those needs a GIS Analyst should be hired immediately in Year One and then another in Year Three. In lieu of new hires, consultants should be used to augment staffing. .  *Adoption of Centralized/Hybrid Model*

- **Annual User Survey** - Annual user satisfaction and input survey
- **GIS User's Group –** A GIS User's group should be formed and meet quarterly. See page 43 of Governance Chapter.
- **Annual Return on Investment Analysis** - Annual analysis of work conducted and impact on organization *Data gathered during the annual user survey*
- **Annual Update to the GIS Strategic Plan** – Document successes, priorities, and budget

Category 2 - Infrastructure

- **GIS Application Virtual Server** – Provisioned by IT as per specifications in the System Architecture Design Chapter. *Goes in Tandem with New GIS Server*
- **GIS Web Application Virtual Server –** Provisioned by IT as per specifications in the System Architecture Design Chapter. *Goes in Tandem with New GIS Server*
- **Database Server –** Provisioned by IT as per specifications in the System Architecture Design Chapter.
- **Staging GIS Servers –** Need a replica of production environment. Planned virtual environment/hardware should support Staging Environment. *Goes in Tandem with New GIS Server and Additional Staff*
- **Desktop Workstations –** The seven Tier 1 users identified in this plan should be upgraded to the "Level 1 Workstation to Run Advanced" configuration detailed in the System Architecture Design Chapter. Costs for these are not included in this plan as should be part of an ongoing IT upgrade regimen.
- **Mobile Hardware –** Tablets (iOS and Android) running the Esri Collector application will accommodate most data collection needs. Only the cost for buying hardware for the GIS Team is included here. It is incumbent upon each Division to budget their own mobile hardware based on their needs. However, each year the GIS Team should present the need for mobile hardware to the appropriate departments as the need are identified.

Category 3 – Maintenance

- **Esri Software –** Core GIS software for the enterprise.
- **Data Mining Middleware –** Annual maintenance on middleware product.

Category 4 – Services and Data

- **GIS Consulting Services –** Annual fund to utilize outside expertise on an as needed basis.
- **Setup of New Server and Migrate all Data to New Server –** After new server is installed and Virtual machines move all GIS software and data to new server.
- **Implementation of ArcGIS for Server Enterprise Standard and SQL –** Upgrade of existing GIS core software to ArcGIS for Server Enterprise Standard and MS SQL. Should use a consultant for this task. *Acquisition of software must occur before implementation*
- **Database Design, Development, and Cleanup –** It is recommended that City of Simi Valley review its implementation of the Esri Local Government Information Model. Staff will need to take the time to clean up and customize the existing data schema. Standardization is needed. This has been partially established. A consultant can be used to finalize this process. *Setup of ArcGIS for Server and SQL must occur first*
- **Data Mining of Polaris Data (Community Services/Library) –** Using a data mining software package, systematically begin data mining from each of the existing *IT* systems used by the departments. This will require extensive knowledge of SQL nomenclature and the data mining tool.
- **Data Mining of Accela Permits Plus (Community Services) –** Using a data mining software package, systematically begin data mining from each of the existing *IT* systems used by the departments. This will require extensive knowledge of SQL nomenclature and the data mining tool.
- **Data Mining of Chameleon Data (Community Services/Animal Control) –** Using a data mining software package, systematically begin data mining from each of the existing *IT* systems used by the departments. This will require extensive knowledge of SQL nomenclature and the data mining tool.
- **Data Mining of Customer Services Data –** Includes business license data, SAP, and Munis data. Using a data mining software package, systematically begin data mining from each of the existing *IT* systems used by the departments. This will require extensive knowledge of SQL nomenclature and the data mining tool.
- **Data Mining of EnerGov Data –** All departments need to view EnerGov data inside their respective intranet browsers. Using a data mining software package, systematically begin data mining from each of the existing *IT* systems used by the departments. This will require extensive knowledge of SQL nomenclature and the data mining tool.

- **Setup of Esri Suite for Community Services –** To include the Esri WebAppBuilder to include different setup for Transit, Library, Customer Services, and Animal Control, Operations Dashboard (Code Enforcement and Nuisance Abatement), and the Esri Swipe Map (Yard Paving)
- **Setup of Esri Web AppBuilder for the City Manager's Office –** Primary intranet portal for the CMO office to include data and reports for Economic Development and Sustainability). This application can be used in the office or field (platform independent).
- **Setup of Esri Suite for Police Department –** Setup and configuration of the Esri GIS Suite (Crimes App, Intranet, Mobile Browser, and Executive Dashboard) – pricing will include fixing the issues with data mining that occurred once the reporting method was changed.
- **Setup of Esri Suite for Emergency Management -** Setup and configuration of the Esri GIS Suite (Common Operational Picture, Post and Pre Disaster Collector, and Disaster Management Dashboard)
- **Setup of Departmental Viewer using Intranet and Mobile GIS Application for Public Works –** Specific departmental setup of Intranet Data Browser. Should use Esri's Web App Builder.
- **Setup and Configuration of Esri Collector Application for Various Public Works Data Projects –** multiple divisions with data collection setup.
- **Setup of the Operations Dashboard for Public Works –** Operations dashboard showing key metrics of the Public Works Department.
- **Setup of Esri Suite for Environmental Services –** The primary portal for Environmental Services will be the EnerGov GIS application. In addition, the department would like a configuration of the Esri SwipeMap. The Esri Collector Application and an instance of Web AppBuilder should be made available to department staff.
- **Bi-Annual Aerial Photography –** Acquire data every two years
- **Data Layers for City Manager's Office –** The City Manager's Office staff accomplish an number of diverse tasks and have a number of data sets that need to be collected or created to include:
    - Economic Indicator Data – business data, household consumer data, real estate data, transportation data, business licensing
    - Sustainability data – energy efficiency, solar adoption, water conservation efforts
    - Vacant and Available Spaces
    - Film Related Data – Permit and filming locations
    - Citizen Complaints

- **Public Works Data Augmentation –** storm water and wastewater. Can use existing staff to do some of this collection with the collector application.
- **CMMS Study Public Works –** a primary need for Public Works is a Computerized Maintenance Management System (CMMS). A study should be conducted identifying the detailed needs, which would serve as the specifications for an RFP.
- **Finish Address Points –** move all points to the rooftops and finish data for multi-tenant dwellings.
- **Digital Data Assessment –** Use ArcGIS Data Reviewer annually on key data sets to find potential issues. Recommend first year to use a consultant to do a digital data assessment of all layers.
- **Open Data Portal –**Implement Esri's Open Data software.
- **Metadata**
    - **Metadata Policy and Standards –** Establish metadata template, data to be populated, and policies for update.
    - **Implement and Populate Metadata –** Implement metadata as described in previous step.

       *Template must be decided upon*
- **Public Facing Applications**
    - **Economic Development (CMO) –** Story Map telling the story of economic development, key economic indicators, and reasons to do business in Simi Valley
    - **Simi Valley Promotional Story Map (CMO) –** Story Map that highlights all of the unique qualities and attractions of Simi Valley.
    - **Simi Valley Events Story Map (CMO) –** application highlighting all of the events throughout the City throughout the year.
    - **311 Application (All Departments) –** GIS based 311 application
    - **Transit Application (Community Services) –** Stop locations, what is around the stops, places in the city of interest (could be pulled from business licenses)
    - **Library and Senior Services Story Map (Community Services) –** story map highlighting the services delivered
    - **Transportation Plan Story Map (Community Services) -** Story Map showcasing key elements of the City's Transportation Plan
    - **Recycling Story Map (Community Services) -** when and where are services offered (household batteries, shredding services, etc.)

- **Story map of non-profits in Simi Valley (Community Services) -** who get grants and services provided, what was done each year, links to the NFPs
- **My Government Services application (Community Services) –** when and where are services provided (Street Sweeping, Trash Pickups)
- **Neighborhood Council Story Map (Community Services) –** Boundaries, executive board members, contact info
- **General Plan Story Map (Environmental Services)** – Story Map showcasing key elements of the City's Comprehensive Plan
- **Projects Story Map (all) –** Story Map highlighting various projects around the City
- **Hazard Mitigation Plan Story Map (EOC) –** highlighting key elements of the hazard mitigation plan to include critical facilities and emergency game plan
- **Meet the Officer Story Map (Police) –** highlights police zones and officers patrolling
- **Neighborhood Watch Districts Story Map (Police) –** districts and key contacts

Category 5 – Software

- **Upgrade to ArcGIS for Enterprise –** Upgrade from existing ArcGIS for Server Workgroup
- **SQL Server –** move from SQL Express to full SQL
- **Public Access Internet Applications –** Various public use portals identified by staff. This line item contains funds for various Internet applications. ArcGIS Online and StoryMaps.
- **Mobile Data Applications –** Collector Application. Departments will be responsible for acquiring their own hardware as needed. Recommend budgeting money bi-annually for the ever changing devices.
- **ArcGIS for Local Government –** Continue implementation of off-the-shelf applications to include Citizen Service Request, and My Municipal Government Services applications.
- **ArcGIS Data Reviewer –** Single use license for reviewing data sets for completeness and data integrity.
- **Data Mining Middleware –** software tool to do automated extracts from existing IT systems
- **Business Analyst Online (CMO and Environmental Services) –** demographics and business data

Category 6 – Training and Education

- **ArcGIS I – Introduction to GIS**
- **ArcGIS II – Essential Workflows** *ArcGIS Desktop 1 or have commensurate skills*
- **ArcGIS III – Performing Analysis** *Students should have taken ArcGIS Desktop 1 and 2 or have commensurate skills*
- **ArcGIS IV – sharing Content on the Web** – for the GIS Manager or his staff
- ***Building Geodatabases*** - *Students should have taken ArcGIS Desktop 1-3 or have commensurate skills*
- **Creating and Maintaining Metadata Using ArcGIS**
- **Deploying and Maintaining a Multiuser Geodatabase**
- **Systems Design Strategies**
- **ArcGIS for Server Site Configuration and Administration**
- **Tier 3 Classes –** Conducted by GIS Team
- **General Training on Use of Collector in the Field –** Various departments
- **Annual Mobile Workshop**
- **Business Analyst Online Training**
- **3D Analyst Training**
- **Spatial Analyst Training**
- **Intro to Geo-Processing Scripts Using Python**
- **Implementing Versioned Workflows and Multiuser Geodatabase**
- **Introduction to Web Development Using ArcGIS API for Javascript**
- **Exploring Enterprise GIS: A Workshop for Leaders**
- **ESRI Regional Conferences/Workshops**
- **Communication Strategy** – The following are items not addressed in the previous sections:
    - **GIS Day –** November of every year
    - **Monthly Personal Meetings –** with key decision makers and department heads
    - **Marketing Efforts –** newspaper, television, brochures, newsletters
    - **Seminars –** throughout the year
    - **Implementation of Blogs, Email and Social Media –** for communications

3
GIS SUSTAINABILITY

GIS is an enterprise asset that should become indispensable for departments and the organization. However, its indispensability does not guarantee its permanence and sustainability. Due to budget constraints, lack of visibility, lack of education, and/or other factors, some organizations have found their GIS budgets shrinking and in some extreme cases their GIS program has been eliminated. This strategic plan has identified the desire and need for expansion of GIS throughout the organization and to external customers. What can the City of Simi Valley do to safeguard their GIS investment and guarantee sustainability? One strategy is the diversification of funding. Some organizations have made the mistake of centralizing all GIS expenditures to include enterprise and departmental GIS needs. This results in a large budget line item that is more susceptible to budget cuts. Additionally, a centralized budget does not adequately reflect the diversified and pervasive needs that include department specific GIS uses. Therefore, it is recommended that the GIS is funded through various budgets. A baseline budget should exist for GIS. This should be a baseline number that ensures the propagation of the enterprise-wide GIS assets such as the core Esri software, base data layers, and enterprise-wide end user tools. IT should budget for traditional IT items such as servers and other hardware items. Lastly, individual departments should budget for department specific software, hardware, and data.

Another key strategy in regards to sustainability is education. It is all too common that organizations have great success with GIS but don't educate the organization about these successes. The Training Chapter of this plan identifies a number of education items that are instrumental to the sustainability of GIS. This includes documentation and dissemination of return-on-investment examples, education opportunities for all staff, elected officials, and the public, as well as, leveraging internal and external media opportunities (television, newspaper, social media, etc.). Additionally, strong leadership and guidance

from the GIS Steering Committee will ensure that GIS is aligned with the overall goals, priorities, and mission of the City of Simi Valley which in turn will be instrumental in ensuring continued GIS success.

It is important to note that the following tactical plan is not an all or nothing strategy. Depending on actual budget allocation, the plan can change and be reprioritized. It is important that the Steering Committee assist the GIS Manager in prioritizing tasks based on the actual budget each year. Each of the items in the tactical plan were prioritized based on the extensive staff interview process, analysis of the system design chapters, and the criticality of items that are necessary for the success of other items. This document and tactical plan should be updated annually based on funding available and changing priorities. The entire plan should be redone in totality every five years. The following tactical plan has a criticality ranking (Ranking column in the following chart). This will help the organization decide on priorities if there is a budget shortfall. The ranking is as follows:

- A – Mandatory item. Without this item other items cannot be accomplished and the project as a whole will be jeopardized.
- B – Important item. The program can still function in the near term if this item is delayed. However, the item is needed and should be considered a high priority.
- C – Desired item. This item is desired but if it is not implemented it will not adversely affect other items. In some cases, this is a departmental item and its importance is departmental.

Outsourcing will be considered the default in the following pricing chart. However, some items can be done with internal resources as staff time allows.

The chart below contains all of the 5-year tactical plan items sorted by task type (Governance, Infrastructure, Maintenance, Services/Data, Software, Training/Education). **Does not include salaries for existing staff.

Five Year Tactical Plan of Action Schedule									
Task	**Department/Division/Agency**	**Task Type**	**Ranking**	**Notes**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
GOVERNANCE									
GIS Steering Committee Establishment and Guidance	GIS Steering Committee	OG	A	GIS Steering Committee will guide GIS priorities.	*	*	*	*	*
Official Adoption of Governance Strategy	GIS Steering Committee	OT	A	Adoption of the governance strategy by the GIS Steering Committee.	*				
Official Adoption of Implementation Plan	GIS Steering Committee	OT	A	Adoption of the Implementation Plan by the GIS Steering Committee.	*				
Adopt and Formalize a Centralized/Hybrid Model	All	OT	A	Formalize how the organization operates regarding GIS. Define roles and responsibilities of GIS Staff and the various divisions/departments.	*				
Change the GIS Coordinator Title to GIS Manager	GIS Steering Committee/Public Works	OT	A	GIS Manager position as outlined on page 33 of Governance Chapter	*				
Hire a GIS Analyst	GIS Team	OG	A	When comparing against similar cities GIS staff is sorely lacking at Simi Valley. Other staff is needed. In lieu of GIS staff a GIS consultant should be used.	$50,000	$50,000	$50,500	$51,000	$51,500
Hire Second GIS Analyst	GIS Team	OG	B	When comparing against similar cities GIS staff is sorely lacking at Simi Valley. Other staff is needed. In lieu of GIS staff a GIS consultant should be used.				$50,000	$50,500
Annual User Survey	GIS Team	OG	B	Annual user satisfaction and input survey. Done internally	$0	$0	$0	$0	$0
GIS Users Group	All	OG	B	Begin a quarterly GIS User's Group	$0	$0	$0	$0	$0
Annual Return on Investment Analysis	GIS Team	OG	B	Annual analysis of work conducted and impact on organization	$0	$0	$0	$0	$0
Annual Update to the Strategic Plan	All	OG	A	Document successes, priorities, and budget.	$0	$5,000	$5,000	$5,000	$5,000
				Grand Total by Year for Governance – (* Does not include salaries for existing staff)	$50,000	$55,000	$55,500	$106,000	$107,000
INFRASTRUCTURE									
Deploy New Physical GIS Server	GIS Team and IT	OT	A	New Server as Per System Design	$15,000				
Deploy GIS Application Virtual Server	GIS Team and IT	OT	A	Installing VMWare on the Physical Server and Creating Virtualized Environment.	$0				
Deploy GIS Web Virtual Server	GIS Team and IT	OT	A	Installing VMWare on the Physical Server and Creating Virtualized Environment.	$0				
Database Server	GIS Team and IT	OT	A	Installing VMWare on the Physical Server and Creating Virtualized Environment.	$0				
Staging GIS Servers	GIS Team and IT	OT	B	On same new physical hardware, set up virtualized environment for the staging – used as sandbox on rare occasions			$0		
Desktop Workstations	Power Users	OG	B	Replace power user's workstations to meet specifications as per City's PC replacement policy. Funds not included here as this should be done as per existing policy and budgeted by each department that needs them.	*	*	*	*	*
Mobile Hardware	GIS Team	OG	B	Tablets for testing and pre-deployment (iOS and Android). Departments will be responsible for acquiring their own as needed. Recommend budgeting money bi-annually for the every changing devices. More information will be detailed in the mobile project.	$5,000		$5,000		$5,000
				Grand Total by Year for Infrastructure	$20,000	$0	$5,000	$0	$5,000
MAINTENANCE									
Esri Annual Maintenance	All	OG	A	Core GIS software for the enterprise. Includes addition of Data Reviewer and the higher level of ArcGIS for Server	$21,500	$28,200	$28,200	$28,200	$28,200
Data Mining Middleware	All	OG	A	Maintenance on Software to automate data extracts from existing IT systems.	$1,995	$1,995	$1,995	$1,995	$1,995
				Grand Total by Year for Maintenance – (Already been acquired. Ongoing cost)	$23,495	$30,195	$30,195	$30,195	$30,195

SERVICES AND DATA									
Task	**Department/Division/Agency**	**Task Type**	**Ranking**	**Notes**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
GIS Consulting Services	GIS Team/All	OG	A	Annual fund to bring in a consultant for an unforeseen need	$7,500	$7,500	$7,500	$7,500	$7,500
Database Design, Development, and Cleanup	GIS Team/All	OG	A	LGIM with alterations. Standardization is needed. A consultant can be used for this process. To include data migration.	$17,500				
Setup of New Servers and Migrate all Data to the New Server	GIS Team with a Consultant	OT	A	Set up of new server environment, virtual environments, staging environment, and migration. IT will set up virtual servers. Data and software migration. Can be done remote.	$9,500				
Implementation of ArcGIS for Server Enterprise Standard and SQL Server	GIS Team with a Consultant	OT	A	Installing and Setup	$5,000				
Data Mining of Polaris Data	Community Services/Library in Conjunction with GIS Team and a Consultant	OT	B	Extraction and address matching of data from existing database for use in GIS. Once set up it becomes and automated routine	$5,000				
Data Mining of Accela Permits Plus Data	Community Services in Conjunction with GIS Team and a Consultant	OT	B	Extraction and address matching of data from existing database for use in GIS. Once set up it becomes and automated routine	$5,000				
Data Mining of Chameleon Data	Community Services/Animal Control in Conjunction with GIS Team and a Consultant	OT	B	Extraction and address matching of data from existing database for use in GIS. Once set up it becomes and automated routine	$5.000				
Data Mining of Customer Service Data	Community Services in Conjunction with GIS Team and a Consultant	OT	B	Extraction and address matching of data from existing database for use in GIS. Once set up it becomes and automated routine. SAP and Munis	$6,500				
Data Mining of Energov Data	GIS Team and a Consultant	OT	B	Extraction and address matching of data from existing database for use in GIS. Once set up it becomes and automated routine	$5,000				
Setup of Esri Suite for Community Services	Community Services in Conjunction with GIS Team and a Consultant	OT	A	To include the Esri WebAppBuilder to include different setup for Transit, Library, Customer Services, and Animal Control, Operations Dashboard (Code Enforcement and Nuisance Abatement), and the Esri Swipe Map (Yard Paving)	$10,000				
Setup of Esri Web AppBuilder for CMO	CMO in Conjunction with GIS Team and a Consultant	OT	A	Primary GIS portal for CMO. Should wait until the end of the second year as much data needs to be compiled.		$9,000			
Setup of Esri Suite for Police Department	Police in Conjunction with GIS Team and a Consultant	OT	A	Crimes App, Intranet, Mobile, and Executive Dashboard – pricing includes fixing data extraction issues	$20,000				
Setup of Esri Suite for Emergency Management	Emergency Management in Conjunction with GIS Team and a Consultant	OT	A	Setup and configuration of the Esri GIS Suite (Common Operational Picture, Post and Pre Disaster Collector, and Disaster Management Dashboard). Onsite training and report setup.	$30,000				
Setup of Departmental Viewer and Mobile GIS Application for Public Works	Public Works in Conjunction with GIS Team and a Consultant	OT	A	Specific departmental setup of Intranet Data Browser. Should use Esri's Web App Builder.	$5,000				
Setup of Esri Collector for Public Works	Public Works in Conjunction with GIS Team and a Consultant	OT	A	Data setup and testing. Onsite training.	$5,000				
Setup of Operations Dashboard for Public Works	Public Works in Conjunction with GIS Team and a Consultant	OT	B	Key metric application		$5,000			
Set up Esri Suite for Environmental Services	Environmental Services with GIS Team and a Consultant	OT	B	Mainly using Energov. Additional uses can be setup by GIS Team.		$0			
Bi-Annual Aerial Photography	GIS Team with CIRGIS	OG	A	Bi-Annually		$15,000		$15,000	
Data Layers for CMO	CMO with GIS Team and a Consultant	OG	B	Economic indicators, sustainability data, film related data		$7,500			
Public Works Data Augmentation	Public Works	OG	A	Storm water and wastewater. Should use existing staff to augment.	$0	$0	$0	$0	$0
CMMS Study	Public Works	OT	A	A primary need for Public Works is a Computerized Maintenance Management System (CMMS). A study should be conducted identifying the detailed needs, which would serve as the specifications for an RFP. This should be in the PW budget and not this budget but $25,000 should be expected					

SERVICES AND DATA (continued)									
Task	**Department/Division/Agency**	**Task Type**	**Ranking**	**Notes**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Finish Address Points	GIS team with a Consultant	OT	A	Move points to rooftop and finish multi-tenant dwellings			$25,000		
Digital Data Assessment	All	OG	B	Use Esri Data Reviewer to assess the completeness and accuracy of key data sets. This should be done annually by GIS Team.	*	*	*	*	*
Open Data Portal	All	OG	B	Implementation of Esri Open Data Portal. Implement Esri software and use consultant for initial setup. Re-evaluate every year after implementation.			$5,000	*	*
Metadata	GIS Team/All	OG	B	• Metadata Policy and Standards – Establish metadata template, data to be populated, and policies for update • Implement and Populate Metadata – Implement metadata as described in previous step.	In-House	*	*	*	*
Economic Development	CMO	OG	B	Story Map telling the story of economic development, key economic indicators, and reasons to do business in Simi Valley			$5,000		
Simi Valley Promotional Story Map	CMO	OT	B	Story Map that highlights all of the unique qualities and attractions of Simi Valley.	$5,000				
Simi Valley Events Story Map	CMO	OG	B	Application highlighting all of the events throughout the City throughout the year.				$5,000	
311 Application	All	OT	B	GIS based 311 application			$5,000	$5,000	$5,000
Transit Application	Community Services (Transit)	OT	B	Stop locations, what is around the stops, places in the city of interest (could be pulled from business licenses)		$5,000			
Library and Senior Services Story Map	Community Services	OT	B	Story map highlighting the services delivered					$5,000
Transportation Plan Story Map	Community Services (Transit)	OT	B	Story Map showcasing key elements of the City's Transportation Plan					$5,000
Recycling Story Map	Community Services	OT	B	When and where are services offered (household batteries, shredding services, etc.)		$5,000			
Story map pf non-profits in Simi Valley	Community Services	OG	B	Who get grants and services provided, what was done each year, links to the NFPs			$5,000		
My Government Services application	Community Services	OT	B	When and where are services provided (Street Sweeping, Trash Pickups). Done internally with GIS staff.	$0				
Neighborhood Council Story Map	Community Services	OG	B	Boundaries, executive board members, contact info. Done internally with GIS staff.		$0			
General Plan Story Map	Environmental Services	OT	B	Story Map showcasing key elements of the City's Comprehensive Plan		$9,000			
Projects Story Map	All	OG	B	Story Map highlighting various projects around the City		$7,500			
Hazard Mitigation Plan Story Map	EOC	OT	B	Highlighting key elements of the hazard mitigation plan to include critical facilities and emergency game plan		$9,500			
Meet the Officer Story Map	Police	OG	C	Highlights police zones and officers patrolling. Done internally with GIS staff.	$0				
Neighborhood Watch Districts Story Map	Police	OG	C	Districts and key contacts. Done internally with GIS staff.		$0			
				Grand Total by Year for Services and Data	$141,000	$36,000	$45,000	$10,000	$15,000
SOFTWARE									
Task	**Department/Division/Agency**	**Task Type**	**Ranking**	**Notes**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Upgrade to ArcGIS Server for Enterprise	All	OT	A	Need to get City pricing from Esri	$20,000				
SQL Server	All	OT	A	Need to work with IT to get best pricing	$10,000				
Intranet Application	All	OT	B	Primary data viewing and analysis portal. More portals and additional functionality. Recommend using Esri's HTML5 Viewer. Already own. Setup of applications included in consulting above	*	*	*	*	*

SOFTWARE (Continued)									
Public Access Internet Applications	Various Departments	D/OT	A	Various public use portals identified by staff. This line item contains funds for various Internet applications. ArcGIS Online and StoryMaps are free. Already own applications. Setup of applications listed in services above.	*	*	*	*	*
Mobile Data Applications	GIS Team	OT	A	Applications for field data access (software, install, and training). Collector for ArcGIS. Enterprise foundation software. Already own.	*	*	*	*	*
ArcGIS for Local Government	GIS Team	OG	B	Implementation of off-the-shelf applications to include Polling Place Locator, Election Results, Citizen Service Request, and My Municipal Government Services applications.	*	*	*	*	*
ArcGIS Data Reviewer Extension (Single Use)	GIS Team	OT	B	For Reviewing Data Layers for Errors. One-time software fee. Not part of existing software	$2,500				
Data Mining Middleware	GIS Team	OT	A	Allows for data mining of existing IT systems	$9,500				
Business Analyst Online	From Esri	OT	B	Annual fee			$1,500	$1,500	$1,500
				Grand Total by Year for Software	$42,000	$0	$1,5000	$1,5000	$1,5000
TRAINING AND EDUCATION									
Task	**Department/Division/Agency**	**Task Type**	**Ranking**	**Notes**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
ArcGIS Desktop I – Introduction to GIS	All Tier Two Users	D/OG	B	Taught every other year by City of Simi Valley's internal trainer. City of Simi Valley should strive for one person to create coursework and train on desktop product usage and another person to train on Geodatabase related topics. First year cost reflects the cost of the City of Simi Valley trainer taking the course. Once complete, the City of Simi Valley trainer should utilize the knowledge gained to create a similar course (maybe more streamlined) for other City of Simi Valley staff. Classes for other City of Simi Valley staff should be taught by this trainer every year (1, 3 & 5).	$1,070		*		*
ArcGIS Desktop II – Essential Workflows	Tier One and Tier Two Users	D/OG	B	Taught every other year by City of Simi Valley's internal trainer. City of Simi Valley should strive for one person to create coursework and train on desktop product usage and another person to train on Geodatabase related topics. First year cost reflects the cost of the City of Simi Valley trainer taking the course. Once complete the City of Simi Valley trainer should utilize the knowledge gained to create a similar course (maybe more streamlined) for other City of Simi Valley staff. Classes for other City of Simi Valley staff should be taught by this trainer every other year (1, 3 & 5).	$1,600		*		*
ArcGIS Desktop III - Performing Analysis	Tier One and Tier Two Users	D/OG	B	Taught every other year by City of Simi Valley's internal trainer. City of Simi Valley should strive for one person to create coursework and train on desktop product usage and another person to train on Geodatabase related topics. First year cost reflects the cost of the City of Simi Valley trainer taking the course. Once complete the City of Simi Valley trainer should utilize the knowledge gained to create a similar course (maybe more streamlined) for other City of Simi Valley staff. Classes for other City of Simi Valley staff should be taught by this trainer every other year (1, 3 & 5).	$1,600		*		*
ArcGIS IV – Sharing Content on the Web	GIS Manager and Information Technologies/GIS Staff	OT	B	On-site at Esri (price reflects class price only – not travel)	$1,070				
Building Geodatabases	Tier One and Tier Two Users	OT	B	Teaches essential concepts and skills needed to efficiently create a geodatabase, add data to it, and realistically model the real-world spatial relationships inherent to your data. City of Simi Valley will learn about unique geodatabase features that help ensure data integrity over time and why the geodatabase is the preferred format for storing and managing geographic data.	$1,500				
Creating and Maintaining Metadata Using ArcGIS	Tier One and Tier Two Users	OT	B	Taught a variety of versioned editing workflows and examines how versioning decisions impact data accuracy and database performance.	$100				
Deploying and Maintaining the Multiuser Geodatabase	GIS Team	OT	B	City of Simi Valley will learn to successfully deploy a multiuser geodatabase to manage the organization's critical geographic data assets. City of Simi Valley will learn about the multiuser geodatabase architecture and installation options, and how to configure the geodatabase for efficient data storage and delivery of data access and editing capabilities to many users.	$1,605				

TRAINING AND EDUCATION (continued)									
Systems Design Strategies	GIS Team	OT	C	If needed	$1,605				
ArcGIS for Server Site Configuration and Administration	GIS Team	OT	B	Optimizing and configuring ArcGIS Server	$1,605				
Tier 3 Classes	Various	D/OG	A	End user training on ArcGIS Server Intranet Portal and Desktop conducted by GIS Team	*	*	*	*	*
General Training on Use of Collector in the Field	Various	D/OG	A	In House by GIS Staff	*	*	*	*	*
Annual Mobile Workshop	Various	D/OG	B	Reviewing mobile technology to encourage departmental use and budgeting for hardware	*	*	*	*	*
Business Analyst Online Training	Various	D/OG	A	In House by GIS Staff		*			
3D Analyst Training	Various	D/OG	A	In House by GIS Staff		*			
Spatial Analyst Training	Various	D/OG	A	In House by GIS Staff		*			
Intro to Geo-processing Scripts Using Python	GIS Team	OT	B	Skills gained used for data automation and data mining		$1,605			
Implementing Versioned Workflows and Multiuser Geodatabase	GIS Team	OT	B	For key GIS Team staff		$1,605			
Introduction to Web Development Using ArcGIS API	GIS Team	OT	C	For key GIS Team staff			$1,605		
Workshop for Leaders	GIS Team	OT	C	For key GIS Team staff	$175				
ESRI Conferences/Workshops	GIS Team and other GIS Users	OG	B	Conferences	$5,000	$5,000	$5,000	$5,000	$5,000
Communication Strategy	GIS Team	OG	A	The following are items not addressed in the previous sections: • GIS Day – November of every year • Monthly Personal Meetings – with key decision makers and department heads • Marketing Efforts – newspaper, television, brochures, newsletters • Seminars – throughout the year Implementation of Blogs, Email and Social Media – for communications	*	*	*	*	*
				Grand Total by Year for Training Less Training Credits from Esri	$16,930	$8,210	$6,605	$5,000	$5,000
				Yearly Total	$293,425	$129,405	$143,800	$152,695	$163,695

4 TACTICAL PLAN OF ACTION SCHEDULE

This following project schedule lists each of the above tactical items by year.

Normal Task | Repeated Each Year | As Needed | Official Decision Point

Tactical Item	Year 1				Year 2				Year 3				Year 4				Year 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
GOVERNANCE																				
GIS Steering Committee Establishment and Guidance																				
Official Adoption of Governance Strategy																				
Official Adoption of Implementation Plan																				
Adopt and Formalize a Centralized/Hybrid Model																				
Move GIS Administrator and GIS Specialists if Governance Options 2 or 3 are selected																				
Hire a GIS Analyst																				
Hire Second GIS Analyst																				
Annual User Survey																				
Annual Return on Investment Analysis																				
Annual Update to the Strategic Plan																				
INFRASTRUCTURE																				
Deploy New Physical GIS Server																				
Deploy GIS Application Virtual Server																				
Deploy GIS Web Virtual Server																				
Database Server																				
Staging GIS Servers																				
Desktop Workstations																				
Mobile Hardware																				
MAINTENANCE																				
Esri Annual Maintenance																				
Data Mining Middleware																				
SERVICES AND DATA																				
GIS Consulting Services																				
Database Design, Development, and Cleanup																				
Setup of New Server and Migrate all Data to the New Server																				
Implementation of ArcGIS for Server Enterprise Standard and SQL Server																				
Data Mining of Polaris Data																				
Data Mining of Accela Permits Data																				
Data Mining of Chameleon Data																				
Data Mining of Customer Service Data																				
Data Mining of Energov Data																				
Setup of Esri Suite for Community Services																				
Setup of Esri Web AppBuilder for CMO																				
Setup of Esri Suite for Police Department																				
Setup of Esri Suite for Emergency Management																				
Setup of Departmental Viewer and Mobile GIS Application for Public Works																				
Setup of Esri Collector for Public Works																				

Normal Task | Repeated Each Year | As Needed | Official Decision Point

SERVICES AND DATA (Continued)																				
Tactical Item	**Year 1**				**Year 2**				**Year 3**				**Year 4**				**Year 5**			
	Q1	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Setup of Operations Dashboard for Public Works																				
Set up Esri Suite for Environmental Services																				
Bi-Annual Aerial Photography																				
Data Layers for CMO																				
Public Works Data Augmentation																				
CMMS Study																				
Finish Address Points																				
Digital Data Assessment																				
Open Data Portal																				
Metadata																				
Economic Development Story Map																				
Simi Valley Promotional Story Map																				
Simi Valley Events Story Map																				
311 Application																				
Transit Application																				
Library and Senior Services Story Map																				
Transportation Plan Story Map																				
Recycling Story Map																				
Story map pf non-profits in Simi Valley																				
My Government Services application																				
Neighborhood Council Story Map																				
General Plan Story Map																				
Projects Story Map																				
Hazard Mitigation Plan Story Map																				
Meet the Officer Story Map																				
Neighborhood Watch Districts Story Map																				
SOFTWARE																				
Upgrade to ArcGIS Server for Enterprise																				
SQL Server																				
Intranet Application																				
Public Access Internet Applications																				
Mobile Data Applications																				
ArcGIS for Local Government																				
ArcGIS Data Reviewer Extension (Single Use)																				
Data Mining Middleware																				
Business Analyst Online																				

TRAINING AND EDUCATION																				
Tactical Item	**Year 1**				**Year 2**				**Year 3**				**Year 4**				**Year 5**			
	Q1	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
ArcGIS Desktop I – Introduction to GIS																				
ArcGIS Desktop II – Essential Workflows																				
ArcGIS Desktop III - Performing Analysis																				
ArcGIS IV – Sharing Content on the Web																				
Building Geodatabases																				
Creating and Maintaining Metadata Using ArcGIS																				
Deploying and Maintaining the Multiuser Geodatabase																				
Systems Design Strategies																				
ArcGIS for Server Site Configuration and Administration																				
Tier 3 Classes																				
General Training on Use of Collector in the Field																				
Annual Mobile Workshop																				
Business Analyst Online Training																				
3D Analyst Training																				
Spatial Analyst Training																				
Implementing Versioned Workflows and Multiuser Geodatabase																				
Intro to Geo-processing Scripts Using Python																				
Introduction to Web Development Using ArcGIS API																				
Workshop for Leaders																				
ESRI Conferences/Workshops																				
Communication Strategy																				

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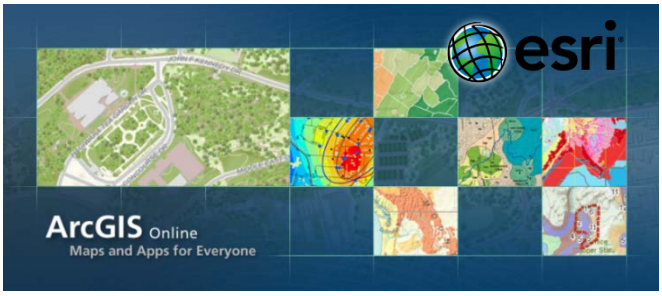
TEN-YEAR FORECAST OF TRENDS

GIS has evolved significantly since its inception. Radical changes in software, databases, hardware, data creation methodologies, and end-user demands are frequent. Therefore, it is incumbent upon local governments to keep an eye on the future. Many local governments fail to do so and find that they are utilizing technology that is antiquated and not delivering expected services. These agencies find that because they have not stayed current with their technology, they do not have a readily available path to implement the latest tools. Often, the expense of having to jump from old GIS technology to new is too onerous, and they are forced to continue with their antiquated tools. In some cases, the organization almost has to start over in order to modernize their GIS. The City of Simi Valley should pay close attention to industry trends. The following are trends that are anticipated to become prevalent over the next decade:

- **GIS in the cloud and software as a service (SaaS)** - Oracle, Google, Amazon, Yahoo, and Salesforce.com have spearheaded the trend of enterprise grid computing using low cost hardware and software that enables virtualization and dynamic provisioning of resources. Google, for example, has shown that this infrastructure is excellent for building scalable, and highly available, geospatial services that provide a rich user experience. Esri has recently embraced this concept, having partnered with Amazon to make (the) ArcGIS Server available via Amazon's Compute Cloud (EC2). Instead of installing and maintaining local instances of ArcGIS Server on premises, customers can launch ArcGIS Server on EC2 instances with

ArcGIS Server preconfigured for them. This is in its early adoption phase and has been slowed as Esri decides on how best to offer true SaaS solutions. It is anticipated that many organizations will move their GIS to the cloud over the next decade.

- **Web Services and Data Sharing** – Although already in existence, web services and data sharing are just in their infancy. The push in the GIS industry now is to make GIS data shareable and available. Esri's software currently allows users to consume data from external feeds. ArcGIS Online is a cloud-based geospatial content management system for storing and managing maps, data, and other geospatial information. Built on Esri's cloud infrastructure, it gives users access to geographic content shared and registered by Esri and GIS users around the world. Other vendors, such as Microsoft, are providing similar tools. Over the next decade, GIS users will transparently be consuming data provided from any number of sources.



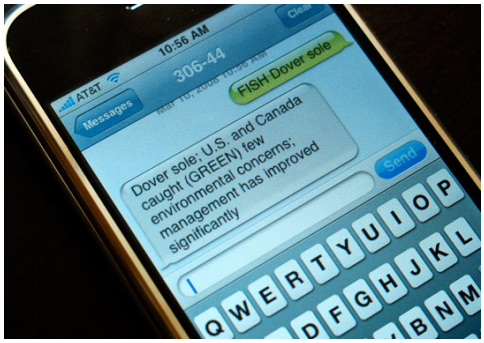
- **Enterprise Integration** – GIS, as the integration tool for local government, has been heralded for many years. The idea is that GIS becomes the portal into all databases within an organization (spatial and non-spatial). For instance, integration between GIS, work management, asset management, outage management, and customer information systems is a desire of local government. Another example is utilizing a GIS address layer as the de-facto address database serving all non-spatial applications. This has not been and will not be an overnight process. Strides have been made over the past few years. Local governments have begun to make integration a mandatory component of any new software system acquisition. Therefore, software vendors are upgrading their software to meet this demand. Over the next decade, this trend will continue. Local government will inch closer and closer to accessing all of their enterprise data through a GIS front-end.

- **Low cost spatial data collection tools and digital data** – The cost of data collection has plummeted over the past decade. Tools have advanced, giving the ability for local government to acquire or collect information. Data collection methods and data availability will continue to expand. Local government GIS staff will need to integrate the ever increasing volume of data to include: radio frequency identification

(RFID), automated meter reading (AMR), digital imaging cameras, airborne and terrestrial LIDAR, and remote sensing satellites. An ever increasing volume of digital data will be consumed via the GIS.

- **Location based services and location tracking** – Public safety has led the way with regards to integrating customer location with the services provided. E-911 and Phase II regulations have allowed agencies to view the spatial location of any call for service (land line calls and cellular calls). Utilizing location based services (LBS) has become ubiquitous for smart phone users. Users can quickly locate their favorite restaurant, an ATM, or any desired services based on their current location and a GIS mapping application. Local governments are implementing automated vehicle location (AVL) to track their fleet. Over the next decade, this will become more prevalent for public and private use. Users will expect local governments to automatically provide LBS information on road closures, the location of the nearest park with desired amenities, the location of special events, parks and recreation offerings, availability of a book at a local library, and the location of the garbage truck that will be picking up their trash. Additionally, users will expect this data to be pushed to their mobile devices. For instance, the trash truck is within an hour of a house for pickup and the customer gets a message letting them know so they can move their trash and/or recycling can(s) to the curb.

- **Citizen notification** – Akin to LBS, discussed in the last bullet, is citizen notification. Public safety has led the way of late in implementing applications that will notify citizens if a crime occurs within a certain distance of their houses, schools, places of worship, etc. Citizens are beginning to expect this type of information to be emailed, texted, or automatically phoned to them. GIS is utilized as the method of geo-enabling an existing database and comparing the event in the database with the citizen's location of concern. The demand for this type of information will continue to increase. It will be expected that a local government will notify citizens when a change of any type is occurring nearby. For example, Wayne County, North Carolina provides its citizens with geo-enabled crime, inspection, nuisance abatement, and school/restaurant sanitation grade information based on a user's geography.



- **Mobile GIS** – Mobile computing has exploded over the past few years. Tablets and smartphones like the iPad, iPhone and Android devices now have GIS applications available. The proliferation of smartphones will help increase the pressure on software companies to continue to produce mobile applications and as computing power and capability increases for such devices, so too will the number of software companies offering mobile solutions. Expect all GIS software companies to offer their core software on these mobile devices. Additionally, a majority of GIS end user applications will become untethered from the traditional personal computer.

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CONCLUSION

It is clear that staff throughout the City need to and desire to continue to utilize GIS technology to conduct their daily tasks. GIS use in local government is going to become more pervasive. GIS will become the de-facto portal for managing and analyzing all data at the City (spatial and non-spatial). The spread of GIS tools has been significant over the past few years. Also, citizens are equipped with an ever increasing array of GIS based tools. They have location aware phones and an assortment of mobile devices. Over the next decade, this will become more prevalent. Users will expect local governments to automatically provide location based service (LBS) information on road closures, the location of the nearest city facility with desired amenities, the location of special events, utility services, availability of a book at a local library, and the location of projects throughout the City. This can only be accomplished through the use of GIS. The City has invested in GIS and will continue to do so. The importance of GIS at the City will continue to increase. Therefore, it is critical to the success of the organization as a whole that the recommendations made in this report are adopted. This will ensure that the City's GIS investment will be viable and will be able to meet the ever increasing demand.

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