

ESRI International Users Conference
Presentation Report

Implementing an Integrated
Enterprise GIS Program
‘Step-by-Step’

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Abstract:

In 1999, the City of Santa Barbara was introduced to GIS through an evaluation by ESRI. The proposal recommended a citywide implementation, which was received conservatively from an administrative and fiscal perspective.

Cooperation began among City departments to compare products and review applications since existing programs such as environmental data collection and property management were likely components for a GIS system-wide program. Various end-users faced obstacles to adopt an integrated GIS system, which included misconceptions about network ‘interference’ and comprehension of the GIS ‘tool’ vs. ‘product’. However, awareness of the value of GIS increased as smaller divisions incorporated GIS into projects proving efficiency to administration.

Finally, implementation of a concentrated GIS endeavor has developed through recognition of a ‘step-by-step’ approach as opposed to a comprehensive program including investment of software/hardware, data construction, training courses and customizable consultation.

A GIS line item has been incorporated into the City’s budget.

Preliminary Steps - Awareness:

The engineers and technicians for the City of Santa Barbara have long been aware of the value in easily accessing data associated with geospatial reference and have made use of such tools embedded in CADD programs to the fullest capacity while researching and proposing GIS applications at every turn. The earliest versions of ArcView obviously demonstrated the ability to maintain data in a system that could insure its integrity among many users. But this proved to be a tool for demonstration rather than a product to be showcased to insure appreciation. Still the technology was received with enough interest to officially research its potential.

In 1999, the City of Santa Barbara Administration was familiarized with GIS technology and the ArcView software through an evaluation report by ESRI. The report proposed a citywide implementation, which was received conservatively from an administrative and fiscal perspective. Even though it was advised in the report to integrate an enterprise GIS program with an evolutionary rather than a revolutionary approach, the price tag and unfamiliarity with this technology could only be perceived as radical and intimidating.

Without any practical GIS experience, the perception was that this was just another more complicated automated map with attractive exhibit capacity.

When a comprehensive GIS system at 3.2 million dollars was proposed, the response from the administration was not very enthusiastic. Automated maps and elementary programs such as Arc Explorer were more feasible to introduce so the leap from these to a full GIS system was perceived as more investment than return.

The awareness of GIS had been established, but an optimistic discernment had to be proven and developed to procure fiscal support and incorporate administrative participation.

Evaluation Steps:

To evaluate a realistic potential for GIS throughout the City of Santa Barbara, cooperation began among smaller divisions within departments to compare products and review applications since some existing programs such as environmental data collection and property management were likely components for an integrated GIS program.

Facilitating this initiative was mainly the interest of technicians participating in the City CAD users group.

Some programs found in operation had used GIS components such as Map Objects for years including noise monitoring and pavement management software.

Other programs rely heavily on data management through Microsoft Access and customized browsers such as property management and automated maps for parcel data.

Eventually the data from aforementioned programs could be utilized in Arcview and more extensive visual analysis performed.

Another part of the departments' evaluation included a review of tasks and procedures considered for time and cost efficiency improvements. Various publications list many applications proven to save time and money by local and state governments are available for comparison and proved to be persuasive to management.

An example of a procedure significantly improved upon is illustrated (Figure A) by a CADD drawing produced to demonstrate a geographic reference of the conditions of airfield pavements. While this one task took much more time and effort to create and update than in Arcview, other tasks proved to be almost impossible to correlate archived data with mapping.

One instance is the request for aviation easements on City parcels. These easements are recorded on each parcel with no cross-referenced historical record compiled to inventory as a whole. The technician was faced with the county assessors library and the dilemma of how to trace shifting parcel data. The cost and time consequence of this task rendered it impossible and illustrates the value of investing now into a dynamic data management tool for the future.

Evaluations continued by utilizing other products such as a 'Geospatial Data Browser', 'Arc Explorer' and automated mapping such as AutoCAD uses blocks with attributes. Again, the robust data analysis or management tools are unfeasible.

Eventually a few individual licenses were budgeted divisionally out of engineering interest in specifically evaluating the Arcview software.

Continued awareness of the value of GIS increased as these divisions built upon existing data with ortho-rectified aerial photography, topographic mapping, and additional layers and the GIS program was incorporated into various projects proving efficiency in data and resource management.

Enough momentum was generated to get the attention of the Administration realizing the technicians were inevitably keeping current with industry advancement.

Implementation Steps:

Implementation of this program can be separated into two strategies.

The first is the fiscal perspective of this program.

Initial steps taken here include evaluating costs and comparing them against available budget.

It was obvious that the proposed all inclusive program budget was much greater than available resources.

Eventually the initiative taken by individuals was supported by a proactive management. This approach diluted the proposed costs among smaller divisions that could more easily reorganize funds from various line items. Individual licenses were acquired, data construction was included in existing contracts for survey and mapping, and purchase orders for training were approved. As these initial users continued to utilize GIS, department heads conceded to maintain and proliferate the technology with an increase in fiscal allocation.

The next perspective is that of perception of function and realization of the effectiveness of GIS to establish a sustainable program.

Proponents faced obstacles to adopt an integrated GIS system, which included misconceptions about network ‘interference’ and comprehension of the ‘tool’ vs. ‘product’.

Without any practical experience in cartography or data management technology which is often performed by technicians and administrative analysts, administrators and managers could not have the dynamic perspective of GIS as a tool that will build upon itself over time.

The charts and maps alone were not visually convincing enough for a multi-million dollar investment. Meetings were held where proposals were reviewed and demonstrations performed to familiarize IT and management with GIS.

Also, misconceptions about stand alone licenses versus network applications and fear of interrupting network formatting had to be addressed.

The term “GIS” was intimidating to even the IT department that, while savvy in networking and hardware supervision, lacked practical experience with this type of software. Interim technologies had included an automated map and geospatial data browser which seemed to be more palatable semantically than the intimidation associated with “GIS”.

The presentations and numerous examples from other municipalities made it approachable and offered the framework for the future of our investment.

Note that early involvement of IT professionals is also necessary to assess the hardware capacity and plan for possible server applications.

When the stand alone licenses were acquired by some divisions of a few departments, it was assured that only data would be stored on the network as any other folder thus calming the notion that a program operating on the network would cause any interference. Server upgrade recommendations would also be made to accommodate future network applications.

Data continued to grow through a combination of incorporating existing data and adding layers contracted through capable consultants as part of topographic map and utility survey contracts. Aerial photos began being ortho-rectified as well.

The city CADD user group continued to study the applications of GIS as a continuum of such programs as the automated map and geospatial data browser and eventually created a GIS users group. This enabled Arcview users to focus on collaboration of this system within the city as whole and the relationships with peripheral agencies to be organized. An MOU was formalized between the county and city for parcel data maintenance as one example of this focus. The group can also provide a forum for newly interested individuals to acquire introductory peer training and established users to fortify training skills.

Continued development throughout government and industry counterparts advocated our program while meetings with statewide agencies (ESRI user groups and CERGIS) educated coordinators about standards and practices developing throughout the industry and provided practical support.

As the program developed incrementally with little designated resources the ‘product’ became more conspicuous with many maps, exhibits and interactive applications being generated for inspection by all.

Extended enterprise advancement is also promising with the heightened interest of emergency service departments. Initiative in a wireless network system from the fire department is being studied and is likely to be pioneered through the airport department since it offers a logically effective environment for establishment. This will open up opportunity for more field application development.

Finally, implementation of a concentrated GIS endeavor has developed through this recognition of a ‘step-by-step’ approach as opposed to a comprehensive program including investment of software/hardware, data construction, training courses and customizable consultation.

After years of borrowing and allocating out of engineering, printing and mapping budgets, a GIS line item has been incorporated into the budget of various departments and a citywide GIS coordinator has been designated.

Acknowledgement:

This paper could not be possible without the guidance of Patricia Eble, City of Santa Barbara GIS coordinator, and the contribution to the GIS program by the CAD and GIS users group.

Many thanks to the leadership of airport director Karen Ramsdell and airport department management: Hazel Johns, Tracy Lincoln, Owen Thomas, and Laurie Owens for providing the progressive environment in which to develop this program.

Also vital to this presentation is the assistance of Sara Iza in airport planning.

Appendix:

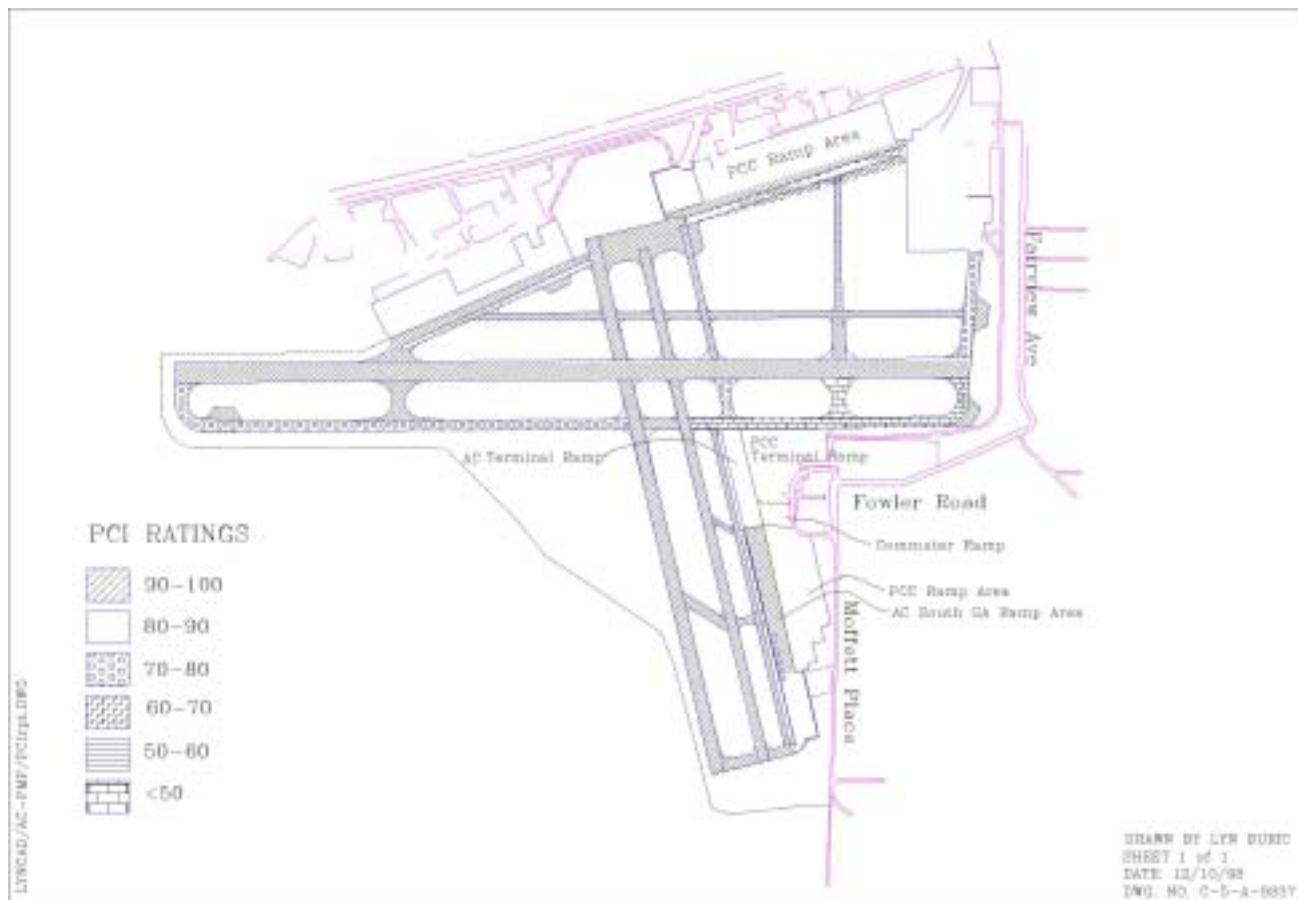


Figure A: CADD based Geospatial Data Analysis Exhibit

SBA Pavement Analysis



Figure B: Arcview based Geospatial Data Analysis Exhibit

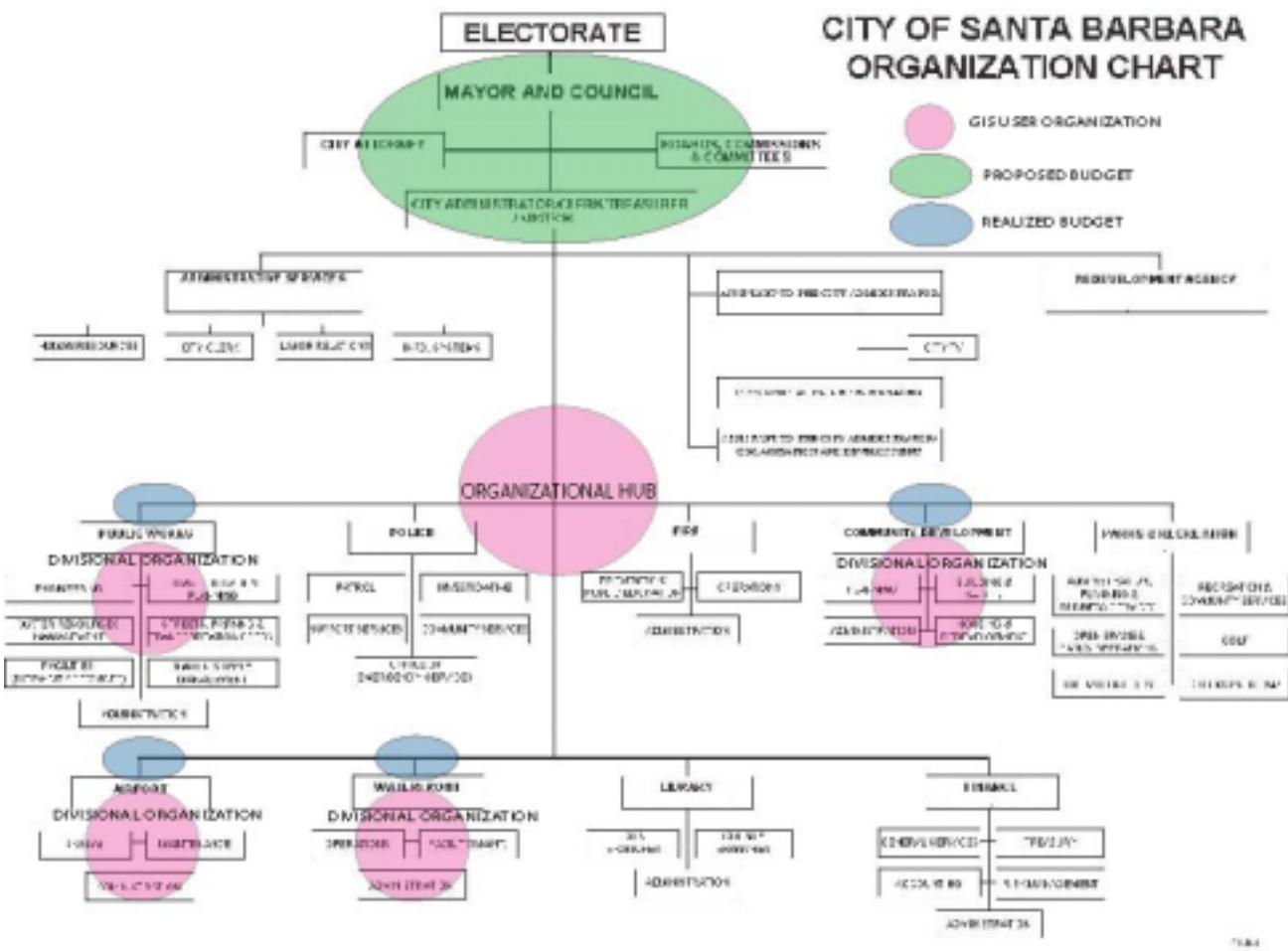


Figure C: Organizational chart with participating divisions

End Notes - Tips and Tricks:

- Do think big from the start.

Organizing the framework and even investing in a consultant for this initial step will preserve many hours of invested time and maintain a momentum otherwise lost on backtracking through re-organization. Sometimes when starting with only a few users – a few various fundamentals may be established and subsequent users may become fragmented.

- Define ‘Power Users’.

Determine up front how many managers your GIS program will need as opposed to ‘End Users’. The power users are most likely on the construction and research end of the program and in our experience make cost-effective use of more advanced Arcview versions. End users will be accessing and maintaining data but rely on that data to be properly organized, and units and projections to be established.

Our budget was enhanced by only purchasing primary maintenance agreements for these few power users. While the end users do not have access to direct technical support from the manufacturer another benefit is systematic problems the managers can identify when asked similar questions by several end users.

- Start with CAD.

With the full integration of CAD into the Engineering and Planning industry most spatial data is already available. Establish standards here. Layer and entity consistency will streamline the incorporation of drawing files to the data tables and to your GIS program.

References:

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- Government Matters by Environmental Systems Research Institute 2003
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