BIOGRAPHICAL INFORMATION

Robert F. Austin, Ph.D.
Director of Business Development GIT
Michael Baker Jr., Inc.

Specific Responsibilities
Responsible for business Geospatial Information Technology business unit marketing, business development and consulting to private industry and the federal government

Past Experience
Robert F. Austin began his professional career in the academic community in 1977 as a professor at the University of Missouri-Columbia and at Oxford Polytechnic (UK). Dr. Austin entered the private sector in 1984, where he has worked in the telecommunications and mapping industries. His technical focus has been the design of GIS for telephone and utility companies and the development of information systems for the design and management of outside plant networks. Dr. Austin's management expertise bridges several disciplines and includes profit-and-loss responsibility for large departments and small, independent companies.

Educational Information
B.A., Geography, University of Michigan
M.A., Geography, University of Michigan
Ph.D., Geography, University of Michigan
Post-doctoral training in Remote Sensing, LARS, Purdue University

Professional Memberships
Geospatial Information and Technology Association (Member)
Malaysian Branch, Royal Asiatic Society (Life Member)
Institute of Electrical and Electronics Engineers (Senior Member)
Federal Communications Bar Association (Associate Member)
GISCI Certified GIS Professional

Lesa Bunting
Area Manager, GIS West
SBC West

Specific Responsibilities
Responsible for managing the construction and on-going update of the GIS landbase for SBC's automated engineering system (ARES) and disseminating information about GIS

technology and GIS landbase throughout other SBC departments

Past Experience
Lesa Bunting began her employment history with Pacific Telephone & Telegraph in 1977 with the Outside Plant Engineering Department. Upon AT&T's divestiture of the Bell System in 1984, she left California to work in the state of Alaska as an Engineering Consultant to several Independent Telephone Companies and Cooperatives, including Matanuska Telephone Association, Interior Telephone and Telephone Utilities of the Northland. After returning to California in 1991, she was an Engineering Consultant to Pacific Bell and Nevada Bell until 1997, when she joined Nevada Bell as a Long Range Planning Engineer. After the acquisition of Nevada Bell by SBC, she was appointed to represent Nevada on a multi-affiliate committee that was tasked with identifying "Best Practices" in the Construction and Engineering disciplines and recommending standardization among the affiliate companies.

Professional Memberships
Geospatial Information and Technology Association (Member)

Kerry J. Smyth
Project Manager, ARES/GIS Implementation
SBC West

Specific Responsibilities
Project manager for the SBC West deployment of the Automated Records & Engineering System and GIS Systems. The five-year project will convert Pacific Bell/Nevada Bell outside plant records into the targeted systems.

Past Experience
Twenty years in software development and project management including positions with Lockheed Martin and McDonnell Douglas.

Educational Information
B.A. Environmental Design, University of Colorado
M.A. Architecture, Southern California Institute of Architecture

Professional Memberships
Registered architect in California

TRL – The Real Landbase: Enterprise Applications and Data Distribution

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ABSTRACT

If properly designed and constructed, digital landbase information is a significant corporate resource that may be shared by multiple departments. This sharing benefits all users by reducing redundant data purchases and data storage requirements, by facilitating information sharing and by simplifying configuration management. Furthermore, properly designed and constructed digital landbase may serve an important function in the contemporary regulatory environment. All these benefits accrue in direct relationship to the initial quality of the landbase and the level of effort exerted for maintenance. This paper expands on these and related issues.

INTRODUCTION

SBC Communications is the local telecommunication service provider in 13 states. SBC maintains over 54.6 million switched access lines and serves more than 14.4 million long distance customers and more than 3.5 million DSL customers. SBC is a Fortune 100 company that employed approximately 157,000 people and generated $40.9 billion in operating revenue in 2003.

SBC West is the division of SBC Communications that provides telecommunications services in California and Nevada. Formerly known by the names Pacific Telesis and Pacific Bell/Nevada Bell (PBNB), SBC West maintains 17.4 million switched access lines through 659 wire centers. Although other carriers serve these states, SBC West maintains and operates interoffice trunk and toll and other communications facilities

throughout both states and is thus concerned technically with the entire geographic area of California (155,973 square miles) and Nevada (109,806 square miles), an area that spans two UTM zones.

In 1997, SBC West's predecessor entity PBNB began to conduct research regarding digital landbase maps and computer mapping requirements for efficient outside plant engineering. During the course of this research, PBNB was acquired by SBC Communications and the mandate for research was broadened to comprise both PBNB and the former Southwestern Bell Telephone. In 1999, Ameritech -- a third Bell Regional Holding Company (RHC) -- merged with SBC Communications and the subject of geospatial information technology was raised as a discussion point in merger negotiations.

In November 1999, the constituent companies of SBC Communications agreed to the corporate deployment of Ameritech's Automated Record and Engineering System (ARES) as a strategic merger initiative. In particular, the merger initiative specified that SBC West would "deploy ARES immediately in PBNB with a more accurate landbase than what is currently deployed in Ameritech today." Subsequent to building a more accurate landbase, SBC would convert its outside plant records to the ARES facilities management system.

Construction of more accurate landbase represented a significant investment for SBC and required consensus building for program support. Particular attention was paid to the subject of spatial accuracy versus real payback, defined not only for the primary initial stakeholders in engineering but also for other operating entities with SBC such as loop assignment, marketing and planning. Attention also was paid to the question of business process re-engineering as the introduction of high quality landbase was expected to engender numerous work process changes as employees moved from manual to digital methods of doing business.

RECAP OF DEPLOYMENT BENEFITS

The landbase project was completed in 2004. As the project directive was accomplished and return on investment was identified, the project team began to examine more intensively the potential for expanding access to this corporate resource. A framework for enterprise deployment began to evolve and access to GIS tools and services was provided to additional groups within SBC West and.

The authors first publicly discussed this project in a presentation to GITA in 2004. In that earlier presentation, we described several areas in which benefits was realized over and above the expected benefits for outside plant engineering, which, it should be emphasized, were sufficient of themselves to justify the initial investment. In brief, these additional benefits included the following examples.

Address Services: Service Area Resolution

- Internal Clients: Regulatory, Address Services, Engineering
- GIS Services: Produced map documenting the SBC client location with the Exchange Boundaries clearly marked
- Value: Clearly illustrated the actual location of the Exchange Boundaries relative to a single parcel; identified the need to adjust Boundaries to correct splitting a single parcel between Exchanges

Boundary Management: Out of Territory Service Requests

- Internal Clients: Regulatory, Address Services, Engineering
- GIS Services: Produced a map identifying the geographic position of a service request relative to two nearby SBC exchanges
- Value: Resolved potential unintended service configuration in non-franchise area

Boundary Management: Exchange Recommendations

- Internal Clients: Planning and Regulatory
- GIS Services: Produced map documenting existing boundary relative to developing area and the proposed boundary change included in an "Advice Letter" to the CPUC
- Value: All residents served from the same exchange; $204,000 savings in construction costs (versus cost if boundary remained unchanged)

GIS Interface: Locate Dispatch

- Internal Clients: Installation & Maintenance "locates" team
- GIS Services: Developed interface between the GIS and locate ticket database to provide WC, DA, Lat-Long and Thomas Brothers Grid
- Value: GIS interface processes 5,000 locate tickets/day; accuracy of dispatch is enhanced; annual savings: $7M

Special Projects: GPS Mapping

- Client: United States Forest Service (USFS)
- GIS Services: Provide GPS equipment, training, data processing and map production for 3-year GPS mapping project
- Value: Mandatory business requirement related to leasing rights-of-way; potential savings in lease fees realized by: eliminating or minimizing existing ROW corridors; provides accurate ROW location documents for future facility design and lease negotiations

Disaster Recovery: Fire Maps

- Internal Clients: SBC Emergency Operation Centers (EOC), Construction and Engineering (C&E)
- GIS Services: Created GIS based fire perimeter maps overlaid on SBC service territory including Wire Centers, DA boundaries and ARES facility data
- Value: Strategic planning and expeditious service restoration supported by accurate fire maps

The last of these examples – Disaster Recovery Fire Maps – unfortunately is a recurring theme in California and Nevada, as it is in much of the western United States. In the remainder of this paper, we consider the importance of accurate digital landbase for SBC West in its efforts to manage risks related to fires and to provide consistently high-quality telecommunications services.

UPDATE ON CURRENT PROJECT ACTIVITIES

Disaster Recovery Fire Mapping

During 2003, California experienced numerous forest fires, including one in the vicinity of San Diego known as the Cedar Fire (in the Cleveland National Forest). This fire ultimately covered an area of 280,278 acres and required the services of 1,478 staff for containment. More than 100 people were injured and 14 people were killed due to this fire. The final estimates of damage included the destruction of 2,232 residences, 22 commercial properties, 566 outbuildings and 148 vehicles, at a cost in excess of $30 million.

Given its proximity to a major metropolitan area, it is not surprising that public utilities were also at risk from fire damage. SBC West operates eight central offices near the ultimate perimeter of the fire, as well as large quantities of cable and support facilities in and around the fire. After learning of the fire's outbreak, the GIS team began assembling information from multiple sources to track the progress of the fire. This information was integrated within the GIS database to assist with efforts at risk assessment and mitigation, as well as recovery.

The GIS team has implemented several procedures and protocols for emergency situations. In the case of fire, for example, the GIS team applies the "SBC Fire Mapping and Design Area Analysis Methodology." This protocol specifies procedures for rapidly updating and distributing specific maps to the Emergency Operations Center (EOC) and to field technicians. The protocol defines a timeline for updates that is based in part on the availability of data from multiple sources, including the U.S. Department of Agriculture's Moderate Resolution Imaging Spectroradiometer (MODIS) web site. After downloading and georeferencing this and other information, the team loads updated fire perimeter locations and related attribute data to a distinct feature class. This update process continues through the working day.

After each update, the maps are exported to a Postscript-format file and e-mailed to the engineering area managers responsible for the affected design areas and the planning area managers for the affected planning areas. The EOC managers and technicians in the region receive and log these maps and assemble collateral information about the fire(s).

The Planning Team within the EOC produced hard copy planning maps. These maps, which included Design Area (DA) information, were produced for several purposes.

First, the maps were used to serve as a visual geographic reference (that is, to provide an overview of the emergency). The maps also served as reporting tools for non-technical management staff. Finally, they were used in the EOC to develop strategies for recovery. Hard copy maps were used to facilitate mark-up and display.

After preliminary planning was completed, staff in the field offices closest to the scenes of disaster produced a second set of hard copy field maps. These field maps were more detailed than the planning maps, reflecting the need for additional detail when locating cables and other outside plant and when navigating through the smoke-filled, charred remains of the transportation network. This second point was particularly important given the need to bring supplementary technical staff from remote locations to assist with disaster recovery. The field technicians provided field information that was used, in turn, by engineers to support temporary repairs and long-term reconstruction.

Our experience in 2003 suggested several enhancements to the protocol. First, we identified a need for additional training for field technicians in the use of a light-weight GIS tool. This has prompted the team to prepare additional applications and training in preparation for the 2004 fire season. Second, we are investigating the deployment of GPS receivers/transmitters in maintenance vehicles, not only to assist with the process of locating outside plant but also to support navigation in areas where road signs and other navigational aids have been damaged or destroyed. (This functionality could also serve to help locate any technicians who are lost or injured.)

Finally, we began to re-evaluate the use of GIS to support the process of reconstruction. Although most damage was identified and repaired promptly, not all damaged plant was known immediately. As much as 11 months passed before some homes were repaired and available for occupation. Some damage to the network remained undetected because no one was attempting to use the network in those areas. We have begun to design GIS applications that would prevent such delays in identifying system damage this in the future.

FUTURE DEVELOPMENT DIRECTIONS

Enhanced and Expanded Access

Having deployed the GIS landbase within several SBC departments, the corporation now plans to provide enhanced and expanded access to numerous other groups. Indeed, success breeds success: the GIS team has been forced to prioritize and schedule the rollout of the system to accommodate resources constraints, including application developers and training staff.

Service Representative Tools

Among the first of the new user groups awaiting access to the GIS landbase are the service representatives at SBC West. Access to accurate landbase has a particularly salutatory affect on field crews. As documented by one of the authors, at one large telephone operating company, fully sixty percent (60%) of the financial benefit of

deploying GIS technology was related to access by service crews.[*] A program is underway to evaluate appropriate hardware and application options.

Network Planning

Since deregulation of the telecommunications industry began in 1984 and accelerated in 1996, competition has become more commonplace. Following key legal rulings in 2004, it is clear that the pace of competition will accelerate further. Appropriate GIS tools are being designed to support cost effective network planning.

Asset Inventory

One logical extension of the engineering design and construction process takes GIS into the area of asset inventory. Pole inventories, for example, are intrinsically geographic, although often stored in flat files or spreadsheets. One logical area of GIS development would be the addition of accurate location information for poles, which could be used to support both accounting true-ups and engineering design in accordance with local and state regulations, such as Government Order 95 (GO-95) in California.

The flip side of competition outside SBC's franchise area is competition from other entities within SBC's service territory. In this regard, accurate landbase can be used to verify attachments and to ensure compliance with regulations such as GO-95. SBC is evaluating this area of development as well.

[*] Robert F. Austin, Ph.D., R.F., "Principles of Ruggedization, Or Field Access: The Last Piece in the Puzzle," AM/FM International Automated Mapping/Facilities Management Conference XV Proceedings, 51-60, 1992.