INTRODUCTION

Miranda (2000) refers to enterprise resource planning (ERP) systems as “the backbone of digital government,” while acknowledging that these systems have just started to penetrate the public sector marketplace. An ERP system will allow the financial, human resources, supply chain and procurement, and other functional components of a government agency’s overall business system to share the same information (Sclafani, 2000). Joplin and Terry (2000) define ERP in the public sector as “commercial off-the-shelf software with extensive fully-integrated functionality encompassing all (or most) of the major automated processes within a public agency.”

Miranda (1999) examined the use of ERP systems in the public sector. Based on the experiences of the consulting practice of the Government Finance Officers Association (GFOA) in advising more than a dozen city, county, and special district governments, some obstacles to ERP implementation in government organizations were identified: the rarity of “live” public sector ERP sites to visit; turf battles over system ownership; difficulty in establishing project management capabilities, identifying full-time staff resources, and finding experienced implementation partners; bottlenecks in the issue resolution process; failure to recognize limitations of ERP systems; under-investing in change management; and sub-optimization of system capabilities. Public sector case studies (e.g., Fontayne-Mack, 1999; Glaser, 1999; Harris, 1999; Jacob and Wagner, 1999; Riper and Durham, 1999) have offered some observations and suggestions on ERP project implementation—e.g., the need for top management commitment, cross-functional participation, and effective change management. These observations and suggestions have been made also with respect to ERP projects in the private sector. Others—e.g., a greater difficulty in finding and dedicating full time project staff—may be more specific to the public sector.

But perhaps an issue of even greater significance when implementing ERP systems in local government agencies is the dearth of information technology (IT) professionals, coupled with the high salary and benefit levels they demand. Joplin and Terry (2000), for instance, cited a shortage of more than 350,000 IT professionals in the year 2000. Since salaries and benefits in the civil service are far from competitive, it has proven increasingly difficult for the public sector to attract and retain skilled IT personnel. A survey on electronic government (“e-government”) undertaken in 2000 by the International City/County Management Association and Public Technology, Inc., with 1,881 out of 3,749 municipalities surveyed responding, ranked the shortage of IT workers as the number one barrier to e-government at the local level (Norris et al., 2001). The lack of financial resources was a second major issue cited by more than 50% of the respondents to the e-government survey. One of the main ways of addressing these challenges to e-government at the local level has been the outsourcing of IT services (Chen and Gant, 2001).

Four primary options for outsourcing IT services are identified by Joplin and Terry (2000): (i) traditional outsourcing, where a private company purchases hardware, hires IT people, and runs applications at an offsite, remote facility; (ii) establishing a not-for-profit hosting company, as a variation of the traditional outsourcing approach; (iii) contracting with a private company that will provide IT staff on-site; and (iv) application hosting, under which an application service provider (ASP) provides remote processing services. The City of San Diego, for instance, established in 1996 the San Diego Data Processing Authority, a non-profit, self-funded company that provided information services to various agencies in the area (Joplin and Terry, 2000). In late 1999, the County of San Diego entered into a $644 million contract with Pennant Alliance—a four-vendor partnership led by Los Angeles-based Computer Sciences Corporation, and including Lucent Technologies, Pacific Bell, and Science Applications International Corporation—involving a three-phase, approach to a full outsourcing of county-wide IT services (Field, 2000). Under this landmark outsourcing contract, the second phase called for implementation of two new ERP applications, PeopleSoft for human resources and Oracle for financial, during the second year. Other public sector agencies that have followed the traditional outsourcing approach are the City of Indianapolis and the Commonwealth of Pennsylvania (Joplin and Terry, 2000).
Apicella (2000) provides the following fairly down-to-earth description of what essentially takes place in ERP application hosting:

“… when you outsource your ERP applications to a service provider, you must move your data off the company’s premises to be hosted on the ASP’s data centers. The typical scenario looks like this: The ASP hosts your applications in one of its data centers, providing your clients browser-based access over the Internet. Your data is stored in the ASP’s databases at the same location, and the ASP takes care of routine data management tasks such as making backup copies, providing sufficient storage capacity for your information, and rotating additional copies to a vault.”

Kent (2002) states that the market for hosted ERP solutions continues to broaden under today’s mantra of “rent, don’t buy.” He identifies factors that drive this ERP rental trend particularly for small to medium-sized companies. One, a “time-to-market” issue, roughly translates into a quick implementation objective for local governments. Another is the earlier cited issue of attaining and retaining capable IT personnel during these times of shortage. These issues clearly go hand-in-hand insofar as local government agencies are concerned. The ERP rental market, in fact, also includes ERP software licenses being paid for on a month-to-month basis. This rental market was projected by Forrester Research to grow to $6 billion by the end of 2003, while an even more bullish forecast of $10 billion had been put forward by the Giga Information Group (Kent, 2002).

The entire process of buying an expensive ERP software license along with upgrades, building and maintaining the hardware and software infrastructure required for the ERP system, and spending months on a lengthy ERP system implementation project has made it clear to a growing number of organizations that hosted ERP solutions is the best, if not the only way to proceed.

Still, there is skepticism about and resistance to the idea of ERP application hosting. Paul (2000) cites the case of Clarent Corporation, a telephone provider based in Redwood City, California which had grown rapidly over a four-year period and needed to upgrade its PC-based accounting application. When the finance people were mulling the idea of hiring an ASP to install and host a PeopleSoft ERP application, Clarent’s IT director’s first reaction was one of: “You want me to take our most critical application with our most critical data and put it outside?”

A white paper prepared by IDC (2001b), a division of International Data Group, on behalf of 12 ASPs, defines application service provisioning as “a form of outsourcing that provides companies access to cutting-edge technologies and enables an organization to focus on its core competencies and goals.” IDC (2001a) also issued a bulletin presenting its opinion of which companies are positioned to be leading ASPs, using a leadership grid based on opportunity alignment along one axis and ability to gain share along the other axis. No ASP is in the “striding ahead” quadrant (high opportunity alignment; high ability to gain share). At the top of the “on their way” quadrant (low opportunity alignment; high ability to gain share) are IBM Global Services and EDS. Not too far behind in this “on their way” quadrant are SAP and PeopleSoft, ASPs that are also ERP software vendors.

Chen and Gant (2001) examine the potential of ASPs to transform e-government services at the local level, and declare that the ASP model assists local governments in overcoming the shortage of skilled IT staff and limited financial resources and “offering next wave e-government services.” They present a fairly good introduction to and survey of ASPs.

THE CITY OF EL PASO AND ITS PREVIOUS IT SYSTEM

The city of El Paso is the fourth largest city in Texas and among the 25 largest cities in the United States. However, it ranked only 312th in per capita income (Zlatkovich and Putnam, 2000) among all U.S. metropolitan areas in 2000. The U.S. Census of 2000 reports El Paso as having a population of close to 564,000, although unofficial estimates place the actual number at probably closer to 700,000. El Paso and its sister city, Ciudad Juarez in the Mexican state of Chihuahua, comprise the largest metropolitan area on the U.S.-Mexico border with a combined population of around 2 million. Ciudad Juarez, the fourth largest city in Mexico, is home to more than 400 maquiladoras. The maquila industry, introduced in Mexico in the 1960s, is based on components being exported from the United States into Mexico for assembly and the assembled products being imported back into the United States—with tariffs and duties being imposed only on the value added.

The city government has some 5,800 employees. Its operating expense budget for the September 2001 – August 2002 fiscal year (about $540 million based on all funding sources) is reported by the Director of its Office of Management and Budget (OMB) to be only 155th among all U.S. cities.

Until 2001, the City of El Paso and the County of El Paso had shared, via a non-profit agency called Consolidated Data Processing, an IT system utilizing mainframe technology and consisting of four major subsystems: Financial and Management Information System; Personnel Management Information System; Advanced Purchasing Information System; and Budget Preparation System. In 1998, the City of El Paso awarded a contract to the original software provider to upgrade the existing system—even as a request for proposal (RFP) had been issued to acquire a new IT system in place of the old one. Under the “upgraded” system, delays and inaccuracies in recording of revenues and expenditures led to month-end financial reports not being available until the middle of the succeeding month. Constant adjustments to the month-end reports resulted from time lags in reporting overtime work, vacation and sick leaves, and special compensation. Accordingly, reports forwarded to the city’s senior management and the City Council invariably included disclaimers as to the accuracy or validity of the information.
ERP SYSTEM AND ASP ARCHITECTURE FOR THE CITY OF EL PASO

ERP System and Hosting by an ASP

In 2000, the city government approved a recommendation by an Executive Committee consisting of key senior managers to terminate the Consolidated Data Processing agreement with the County of El Paso and establish an IT system that effectively and efficiently meets the city’s financial management and human resources information requirements. Of equal significance, it was decided that the financial and human resources management applications would be hosted by an ASP, particularly in view of the expected difficulty of hiring capable IT staff given the low salary levels that the city could offer. Moreover, it was recognized that an ASP arrangement would allow the city to avoid a high, upfront investment in computer hardware. Other than user workstations and internal wiring onsite, hardware would be owned, operated, and maintained by the ASP entity.

An RFP for a financial and human resources information system was issued in September 2000, along with one for the ASP arrangement. (No specific reference to an ERP system was made in the RFP.) Seventeen proposals were received for the financial and human resources information system. System capability and flexibility carried more weight than the cost in evaluating the proposals. The selection process was narrowed down to three ERP system vendors: PeopleSoft, SAP, and JD Edwards.

In January 2000, JD Edwards had launched its own ASP division, changing its previous partner-only ASP strategy (Wainewright, 2000a). While rival ERP software vendors PeopleSoft and SAP soon followed suit and set up their own ASP divisions, JD Edwards abandoned its ASP division in October 2000, deciding to concentrate on strengthening its ASP partner channel (Wainewright, 2000b). Both PeopleSoft and SAP, as earlier mentioned, appear in the “on their way” quadrant of the IDC leadership grid of ASPs (IDC, 2001a).

City officials awarded in March 2001 a contract to PeopleSoft for its ERP solution to the city’s financial and human resources management information requirements. The PeopleSoft ERP license, which the city purchased at a cost of $2.1 million, covers the Financial Data Management (FDM), Human Resources Management System (HRMS), and Enterprise Performance Management (EPM) suites. Separate contracts for Kronos (a time management reporting system) and CORE (a cash management system) were awarded to independent vendors of these systems. Kronos and CORE hardware and software were to reside in the city, but would have to interface with the ERP system.

The city also awarded the ASP contract to PeopleSoft, with a remote application hosting facility (called the PeopleSoft eCenter) located in Pleasanton, California. The contract for ASP services provides for a three-tiered set of monthly fees applicable to (i) the first nine months; (ii) when ERP system users are involved; and (iii) when full functionality of the system is in place. There is a five-year guaranteed monthly fee at full functionality. [PeopleSoft reports that it has been ranked by Gartner Dataquest as the fourth largest ASP in North America (see www.peoplesoft.com).] According to a source involved in selling ASP services, PeopleSoft had approximately 50 ASP contracts as of early February 2002. He believes the ASP agreement with the city of El Paso to be the first such engagement with a local government entity for PeopleSoft.

ASP Architecture

Figure 1 provides a simplified illustration of the basic ASP setup. The ERP software and servers reside in the Pleasanton eCenter, and onsite user workstations communicate with the servers by way of a T-1 connection through MCI (a fractional T-1 connection at 256 Kbps), for which the city pays MCI a fixed monthly fee. To provide for redundancy, an ISDN connection between the city and the Pleasanton eCenter (at a significantly lower monthly fee) was recommended by PeopleSoft, but the city never established such a redundant connection.

On January 29, 2002, PeopleSoft announced a partnership with Hewlett-Packard for the global expansion of the PeopleSoft eCenter, using HP’s international network of data centers. Under this partnership, PeopleSoft’s application hosting business will be managed by HP. As a result, remote hosting of the city of El Paso’s ERP system will be moved from the current Pleasanton site to HP’s data center in Tampa, Florida. As of late July 2002, a copy of production data has been migrated from the Pleasanton eCenter to the Tampa eCenter and system testing is ongoing. [The payroll subsystem has tested well, but problems have been reported in the activity-based management, purchasing, and report writer modules. Nonetheless, these reported problems are not presently viewed as major obstacles to the migration of remote hosting to the Tampa eCenter.] The T-1 connection between the city and the Tampa eCenter, also through MCI, is more robust at 798 Kbps. Already, quicker system response has been observed during the ongoing test, as a result of the higher bandwidth. Moreover, a DS-3 line has been acquired by the city for Internet access; it will provide the desired redundancy should the T-1 connection fail. Figure 1 continues to provide a simplified illustration of the ASP setup using the Tampa eCenter.

ERP SYSTEM IMPLEMENTATION

The eVerge Group, a Dallas-based firm that has worked with PeopleSoft on a number of other projects, was awarded a $2.2 million contract to oversee ERP system implementation. [PeopleSoft Consulting (PSC), a PeopleSoft division that undertakes system implementation projects for clients, would have cost the city roughly twice this amount.]
A steering committee, composed of city officials representing the key business process areas of human resources, budgeting, benefits, purchasing, and finance, was constituted to oversee system implementation. A full-time Project Leader, based in the Office of Management & Budget (OMB), was designated in early April 2001 to head an in-house core project team that would directly interface with the eVerge system implementation team. The core team membership included one representative each from Purchasing, Human Resources, Finance, and OMB and two from the IT department.

A number of basic modules of the ERP system (general ledger, accounts payable, accounts receivable, purchasing, fixed assets, projects accounting, human resources, payroll, and benefits management) and the CORE cash management system were targeted to be in place by September 1, 2001, the start of the city’s fiscal year. The initial modules were actually made operational as of September 4, 2001, while the CORE cash management system was made operational on September 13, 2001.

Introduction of the Kronos time management system, originally planned for December 31, 2001, was eventually moved up to September 4, 2001. Especially at the initial operation of the Kronos system, improper swiping of ID cards through the card readers by a significant number of employees, even though they had been taught how to do so, created problems with the payroll module. As a result, a parallel run of the old payroll subsystem was undertaken for three additional weeks beyond the planned three initial parallel trial runs (Solis et al., 2002).

The budgeting module was planned for initial use by February 2002 (in preparing the budget for the 2002-2003 fiscal year), but has been postponed to February 2003 (applying to the 2003-2004 fiscal year), by which time an improved, Web-based version of the module is expected to be available. Meanwhile, eVerge has provided the city with an Excel-based interim solution for the 2002-2003 fiscal year.

An activity-based management (ABM) module under the EPM suite has been installed during the first quarter and is currently still undergoing testing.

The FDM and HRMS suites initially installed were from version 7.5 of the PeopleSoft ERP system, based on a client-server setup. This client-server setup requires the use of Citrix servers at the eCenter, which allow access to the application servers and databases. The HRMS suite has since been upgraded to web browser-based version 8.0. The upgrade to web browser-based version 8.4 of the FDM suite was originally expected to be completed by April 2002. However, this target completion has been moved back to the end of October 2002. As of late July 2002, an upgrade to FDM version 7.6.2 (still under a client-server architecture) was in the process of completion. The Citrix servers will not be needed once FDM version 8.4 is in place (and have no longer been featured in Figure 1).

CONCLUSION

In an earlier paper, a number of key issues and problems in the implementation of the city of El Paso’s ERP system as of yearend 2001 were identified (Solis et al., 2002). Experience with earlier projects (e.g., Fontayne-Mack, 1999; Miranda, 1999) has suggested that
team members be fully dedicated to an ERP system implementation project; however, some members of the city of El Paso’s core project team were not. Accordingly, the team leader had been unable to exercise proper authority over the team members, some of whom continued to be on call for other work associated with their home department. Moreover, there had been some reluctance on the part of some department managers to assign their “star” performers to take on key user roles in system implementation. The same held true for personnel assigned to “train the trainer” programs.

There may have been some problems when the ERP system first “went live” on September 4, 2001—e.g., with the payroll module, which required using the old payroll subsystem for three weeks after system startup. The entire system is not yet fully installed and operational (e.g., implementation of the budgeting module has been put off for February 2003) and will not be fully web-browser based any earlier than the end of October 2002. Notwithstanding the issues and problems that have been identified, it is important to note that the decision to use the PeopleSoft eCenter for hosting the ERP system has allowed the city to “fast track” system implementation—with the system “going live” within five months of the start of the system implementation project and with most of the key modules (general ledger, accounts payable, accounts receivable, human resources, payroll, benefits, among others) now being operational. It would have taken the city many more months had it decided on an in-house ERP implementation. Moreover, the city would probably have had to contend with more and much larger implementation pains in the face of an expected lack of capable IT personnel to undertake an onsite implementation.

A new IT Director came on board as of May 2001, shortly after the ERP system implementation project was started. [The IT Director has been the only regular city employee on the IT technical staff; all other IT technical personnel have been hired as contractural in view of stringent civil service salary levels.] As a result of the ASP model, the IT Director has not had to contend with directly managing ERP system implementation—a process which is overseen by a steering committee (of which the IT Director is a member) and an in-house core project team that interfaces with the eVerge system implementation team and the PeopleSoft eCenter. Accordingly, the IT Director has been able to focus his attention on both strategic and operational concerns associated with the city’s overall IT services infrastructure. [In July 2002, the IT Director accepted a position in another organization and the erstwhile Assistant Director has taken over as Interim IT Director. Both continue to express a firm belief that the migration of the city’s ERP system from the Pleasanton eCenter to the Tampa eCenter will be beneficial to the city, citing the professionalism of HP’s staff and the more robust T-1 connection.]

The authors will render a report on the latest status of ERP system implementation, including the expected completion of the migration of remote system hosting to the Tampa eCenter, in November 2002.

REFERENCES


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