

Case Study: Services Oriented Architecture (SOA) journey at a Municipal Utility

Background

Fayetteville Public Works Commission (FPWC) provides electricity, water and wastewater services to approximately 110,000 customers in the City of Fayetteville, N.C. and surrounding areas within the county. It is the largest municipally owned electric system in North Carolina. FPWC has been recognized three times by the American Public Power Association as a Diamond Level Reliable Public Power Provider – only two other utilities in the nation have achieved this recognition.

In July, 2012, FPWC embarked a program to improve customer service and support smart grid initiatives. The initiative includes modernization of business systems in a phased approach, as shown in figure 1. Some of the key tenets of the approach include integration of disparate business processes in a Services Oriented Architecture (SOA) fashion to allow for reuse and automation.



Figure 1: Phased approach to support customer service and smart grid initiatives

Benefits to Citizens

- 1) Improve communication between customer service representatives, dispatchers and technicians – ultimately boosting workforce productivity and reducing operating expenses while helping eliminate missed appointments, service backlogs and overtime costs.
- 2) Improve the availability of historical asset data and secure real-time, enterprise-wide visibility into the type, location and condition of its assets – such as electric transformers and water and wastewater pipes – to help maximize operational efficiency and make better strategic capital investment decisions.
- 3) Complete view of customer data, helping to streamline billing processes and enable more responsive customer service.
- 4) Improve the information it presents to its customers on monthly bills and through its Web self-service offering.
- 5) More quickly and easily adapt to an increasingly complex and expanding regulatory and compliance environment (i.e. North American Electric Reliability Corporation, Federal Energy Regulatory Commission, North Carolina Utilities Commission and other regulatory boards including cyber security and related standard/regulation enforcement agencies).

SOA Strategy and Architecture

At the kickoff of the engagement workshops were organized to understand FPWC's business goals, challenges, and identify opportunities for improvement. The SOA strategy and architecture was defined based on these inputs.

Business Goals

The first task at hand was to lay down FPWC business goals as they relate to SOA. FPWC's key goal was to automate integration between business processes in scope for system modernization, and with legacy systems, and also support smart grid and future business requirements down the line. FPWC wanted to leverage SOA for reusability and efficiency reasons. In order to make this happen in a timely manner and reduce risk, FPWC decided to minimize impact on external partners/systems and on legacy systems. To meet budget restrictions, the key tenets for architecture had to be ease of maintenance & support. To further reduce maintenance cost, FPWC decided to standardize and minimize number of integration tools and use pre-defined patterns, toolset, and technologies. FPWC also needed to design SOA infrastructure and overall solution for high availability since interfaces are the "backbone of the enterprise".

Challenges and Opportunities

Next, FPWC identified opportunities for improvement and challenges they were currently facing with respect to SOA. Some of these were typical such as multiple data entry in systems because not all interfaces are automated. FPWC also did not have a SOA strategy in place and had more than one product being used for similar tasks which leads to higher support effort. In addition there was no centralized place to monitor business and technology exceptions and to notify respective users to allow them for reprocessing of the failed transactions. Being a municipal entity paid for by tax payers, there is limited resource availability and training budget for technology support.

Strategy & Architecture

The strategy and architecture for SOA interfaces was based on the FPWC business goals and challenges as mentioned above. The architecture and tool selection leveraged out-of-the-box functionality as much as possible with minimal customization. In addition, FPWC decided to use minimal number of products and technologies, and interfaces in general. This architecture helped FPWC meet goals to minimize support and maintenance effort. Existing interfaces were evaluated to be reused on a case by case basis to minimize the business impact on external B2B partners and vendors. In addition, a common service was created for error logging and notification of business impact and technical root cause. This service can be exposed as a web service and reused across the enterprise. FPWC executed an extensive plan to train its resources on the new technologies in order to make best business decisions and effectively support the new systems after going live.

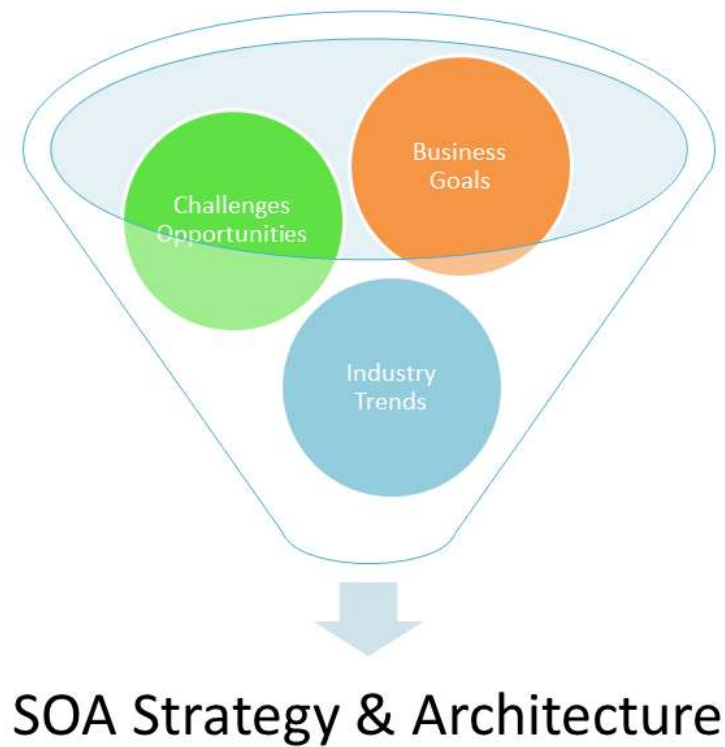


Figure 2: Technology strategy is crucial for business

Lessons Learned and Best Practices

- 1) Strategy document laid down a very good foundation for architecture and design and helped make decisions that would otherwise have taken too long or may have caused us to make costly and incorrect decisions.
- 2) To ensure success on IT programs, it is essential to manage people and process, in addition to technology. It was crucial for the success of SOA program at FPWC to have leadership that bridged cultural differences, managed technology, and planned for dependencies and risk in a proactive manner (the SOA program at FPWC had zero attrition).
- 3) A proactive approach helps in moving from “fighting fire mode” to a “continuous improvement culture”. Tools and processes like CMMI, ITIL, and Six Sigma were very helpful at FPWC to implement SOA with 0 defects and on-time delivery, which can be challenging goals in large IT transformation programs (the SOA program at FPWC is rated at CMMI 5 maturity).
- 4) It is important to be realistic about what it would take to support new technologies and have a clear understanding of roles & responsibilities. The existing resources may be burdened with supporting as-is business, new systems as well as learn and support the new functions. If you squeeze the lemon too much, it gets bitter and leads to attrition.
- 5) Lastly, change management and risk management are very important functions for transformation programs. Managing employee concerns about job security, future growth, and work load were crucial in ensuring zero attrition.



Figure 3: Not-so-secret recipe for success in IT programs

The SOA journey at FPWC is not complete and we have had our share of challenges and hindrances that kept us on our toes. Proactive management of people, process, and technology has been immensely helpful, and we keep our fingers crossed.

Customer Feedback

“Rohit has been very diligent in understanding our current practices and future plans; then giving us recommendations that move us along that path. He consistently presented best practices before each major decision to ensure we have a solid range of options in each area. This has enabled us to make well informed decisions balancing capability with maintenance efforts in the future solution based on our business requirements.” - David Mazza, Technology Manager, Fayetteville PWC, North Carolina.

FPWC Technology Stack

- Oracle SOA Suite
- Oracle Service Bus
- Oracle BPEL Process Manager
- Oracle Business Activity Monitoring
- Oracle Data Integration
- Oracle Application Integration Architecture
- Oracle AIA Process Integration Pack
- WebLogic
- IBM MQ
- Oracle E-Business Suite Financials
- Oracle E-Business Suite Supply Chain
- Oracle E-Business Suite Human Capital Management
- Oracle Utilities Work and Asset Management (WAM)
- Oracle Utilities Customer Care and Billing (CCB)
- Oracle Utilities Meter Data Management
- Oracle Utilities Mobile Workforce Management
- ESRI GIS