T&D Asset Data Management Strategy for PacifiCorp

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ESRI Electric and Gas Users Group
October 18, 2005
Lake Tahoe, CA
PacifiCorp Quick Facts

- Over 1.6 million electric customers in six states, 136,000 sq-mi.
- Doing business as Pacific Power and Utah Power
- Low-cost, reliable energy producer
- Over 8,400 megawatts of generation capacity from coal, hydro, gas-fired combustion turbines, geothermal, co-generation and renewable wind power
- 6,400 employees in the United States, headquartered in Portland, Oregon
- Currently part of the ScottishPower, pending merger with MidAmerican Energy.
Topics

- Power Delivery Business Technology Strategy
- Strategy Overview
- Cornerstone Initiatives
- Asset Data Synchronization Strategy
  - Current Situation
  - Objectives
  - Analysis
  - Options
  - Examples
  - Future Vision
- GIS Strategy & Roll-out
- Summary
We Need IT Strategy…

- Regulatory and customer demands require utilities to do more with less.
- IT projects have a mixed track record:
  - Research by Paul Strassman shows no correlation between investment in IT and the overall performance of a firm.
  - One study by the Massachusetts Institute of Technology was even worse; it showed a negative return; that is, the more a firm spent on IT, the worse it did.

Source: Tony Murphy, Achieving Business Value From Technology
Alignment of Business & Technology

- Vision
- Business Strategy
- Business Processes
- IT Investment Strategy
- Technology & Architecture
Business Technology Strategy Development

- Scope
- Business Strategy
- Business Process Assessment
- Application, Data, & Infrastructure Assessment
- Business Technology Investment Strategy
- Application Architecture
- Business Technology Investment Plan
Business Unit Strategy Alignment

- Manage on-going labor costs
- Increase and Prioritize Distribution system maintenance to improve reliability and life-cycle cost
- Recognize and plan for growth in number of customers and system load
- Further develop business improvement capability
- Elevate profile of safety and environment
- Strengthen internal controls and security
- Plan to replenish critical skills as aging workforce retires
Business Process Assessment

- Enterprise Wide Map Created of PD business line processes:
  - Manage Power Delivery
  - Manage Customer
  - Connect Customer
  - Provide Network
  - Operate Network
  - Record Usage
  - Collect Revenue

- Over 1,450 processes mapped within 200 business process diagrams

- 167 critical business processes (BP) selected for evaluation:
  - BP documented - 75% green
  - BP understood - 74% green
  - adherence to BP occurred - 67% green
  - BP supported business strategy - 78% green
  - BP consistent within lines of business - 64% green
  - BP supported business information needs - 56% green
  - BP used metrics - 54% green
  - IT systems adequate to support BP – 43% green
Applications, Data, & Infrastructure

- 120 applications evaluated by business line process:
  - 73% considered business critical
  - Users access multiple systems to get complete data for analysis and reporting
  - Compilation of data for reporting is manual in several areas
  - SAP user interface and reporting criticized; may be training or documentation issue
  - Business application documentation lacking; particularly for internally developed applications
  - Sufficient data quality is lacking to support proper business planning and forecasting for assets and people
  - Lack of audit trails which would support process and data quality improvement
Power Delivery IT Strategy Overview

- Leverage Corporate and Power Delivery Core Applications
- Deliver Effective Enterprise Application Integration (TIBCO/CIM): Asset Data Synchronization
- Realign IT Resources to Deliver Cornerstone Initiatives
- Renovate Disparate Legacy Applications into Core
- Prioritize IT investments based on:
  - Strategic Alignment Score
  - Ability for business change
  - Technology and data platform
  - Capital and O&M constraints
  - Hard benefits for financial value
  - Customer focus using PVRR(d)
Cornerstone Initiatives

- Outage Management: shore up with new SCADA System
- **Asset Data Synchronization**
  tightly linked to GIS and SAP
- **GIS/ESRI roll-out**
  - T&D Network Connectivity Data
  - Remaining T&D asset Data Management
  - Graphic Estimating
  - Mobile Data Management
- **Work Planning and Scheduling**
  - Optimizing People, Equipment, and Materials with work to be performed
  - Inspections / Mobile Computing
- **Renovation Program**
  - Improve data integrity, reduce IT OMAG, simplify future integrations
Asset Data Management Issues

- Business processes not streamlined across business units.
- Data is created in multiple systems. This results in:
  - Data Quality Issues
  - Data Reconciliation Issues
  - Data Compatibility Issues
  - Data Reporting Issues
- These issues impact our level of confidence, reliability and accuracy of some data.
- Limits ability to leverage more advanced Asset Management Science and Technologies.
Asset Data Synchronization Overview

Three dimensional approach to Asset Data Synchronization

**Business Unit IT Strategy**
- Drives **timing** of asset data synchronization effort
- Strategy aligns with the systems targeted for **renovation**

**Business Processes**
- Business Process Alignment
- Business Process Enforcement
- Business Process Controls
- Business Process Ownership

**Asset Data**
- Creation, Reading, Updating, Deleting
- Quality
- Naming
- Reconciliation
- Synchronization
- Reporting
PacifiCorp’s Options

- **OPTION 1 – Asset Data Located in One System**
  - Multiple systems with the same asset data are needed to perform different functions (e.g., outage management, mapping, load analysis, tracking of costs).
  - No one system can perform all functions.

- **OPTION 2 – TIBCO Messages with No Bus Services**
  - Provides little assurance asset data synchronization will be controlled and managed.

- **OPTION 3 – TIBCO Messages with Bus Services**
  - Adds services to Option 2 (i.e., naming conventions, system of record standards) to control and manage asset data synchronization.
  - **Recommended option.**

- **OPTION 4 – Point-to-Point Integration**
  - Not compliant with PacifiCorp’s IT Strategy.
  - Lower initial costs, but higher lifecycle costs – not cost effective over the long run.

- **OPTION 5 – Current Path with No Changes**
  - New systems identified in the BTF are planned to be implemented using the TIBCO bus, but existing systems with point-to-point integration are excluded.
Enterprise Application Integration (EAI) Infrastructure

- Cost avoidance through reuse and standardization - eliminating point to point interfaces.
- Reduced maintenance costs.
- Predictable Deployment.
- More reliable.
- Operations Center monitors events.
- External business partner integration.
PacifiCorp’s TIBCO/CIM Infrastructure

- 6-years history with TIBCO at PacifiCorp.
- Cross reference data using the IEC Common Information Model (CIM).
- Created effective computing infrastructure platform for business solutions.
- Shifted solution delivery from code to configure.
- Process analysis & integration: Highlights opportunities for business improvement.
- Overall architecture, business process design linked with development cycle.
- Business process oversight for Sarbanes/Oxley requirements.
Asset Data Synchronization Objectives

- **BUSINESS PROCESSES** – Improve processes to assist in asset data synchronize across business units; enforce the processes through better training and management controls; and improve internal controls to increase assurance of accurate data entry.

- **OWNERSHIP** – Identify system of record for all asset data and which business unit or department owns the asset data.

- **RECONCILIATION** - Improve ability for data reconciliation between systems.

- **ACCURACY/QUALITY** - Ability to get accurate asset information from a core system and the ancillary systems (e.g., provide internal controls of how data is entered).

- **NAMING** - Data integrity of asset names between systems that enables comparability of data between systems.

- **SECURITY** - Changes in subsidiary systems will not update other systems unless authorized.

- **LOCATION** - Improve ability to identify where accurate asset data can be obtained.

- **REPORTING** - Improve ability to obtain accurate reports about assets.
Asset Data Synchronization Strategy

- Improve business processes to operationally correct the data then determine if it is cost effective to clean up the historical data.

- Develop Data Integrity Standards and Requirements document.
  - Rules for creating, reading, updating and deleting asset data in the system of record.

- Develop standards/controls.
  - Continuity between asset attribute CIM name and systems.

- Revise Project Management templates to include more data quality components and checkpoints.
Asset Data Synchronization Strategy

- Synchronizing asset data is **not a stand-alone project** but sets the controls for future technology initiatives (data blueprint).
- Synchronization of asset data is most easily and economically **accomplished in conjunction with system replacement, retirement and data reduction efforts.**
Impact to Future Projects

- Data quality will be embedded into all new project structures – not standalone initiatives.

- Project team responsible for:
  - Adhering to the naming and synchronization standards.
  - Developing CIM mapping/messaging.
  - Performing asset data management lifecycle analysis (as-is and to-be).
  - Assign Clear Accountability and Quality Metrics
  - Obtaining approval that data quality requirements have been met.
What is the impact if we do nothing?

- Asset Management Science can not be effectively implemented without good data – garbage in/garbage out.
  - Lack of confidence in the reliability and accuracy of some asset data.
  - Data reporting inconsistencies will continue.
- GIS will be more costly to implement.
- Continued high cost to maintain data quality in multiple systems.
- Adherence to Sarbanes Oxley and other regulatory compliance may be compromised.
Conceptual Example

GIS Operator Creates New Line Extension

1. **Aspen 1 Liner**
2. **SAP**
3. **RCMS Work Tracking**
4. **ESRI**
5. **Sched OASIS**

**TIBCO Infrastructure (Message an asset Changed)**

- **Proprietary “New Facilities” Message**
- **CIM-Encoded Message**
- **CIM Data Mapping**

- **Message is validated**
- **Asset Services**
- **CSS**
- **CADOPS**
- **EDW BW**
- **Substation Design**

- **applications updated with new facility information**

1. **X-Ref & Rules**

2. **New Facilities**

3. **Message**

4. **Encoded**

5. **Message is validated**
Future Possibilities for Asset Management

Asset Services locate appropriate information and routes request.

Information is compiled and sent.

Information is returned to client.

Asset Information Request is made.

TIBCO

SAP

CSS

SCHOOL

CADOPS

ESRI

TIB Portal

WEB Services (Servlets)

ORACLE Database

WEB Database

World Wide WEB

asset Services provides keys to join data.
GIS Strategy

- Combine many legacy/disparate asset applications into a single geospatial database and build applications tightly linked to SAP for asset & financial management.

- Phased approach:
  - Pole Asset Data Management System (PADMS) – see Eileen Frimberger’s session at 10:30am today in Emigrant Peak
  - Other quick hits – e.g. Maintenance Optimization (MO)
  - Outage Mgt. Connectivity Data
  - Transmission Network Model
  - Remaining T&D assets
  - Graphic Estimating
  - Mobile Data Management
  - Work Management Integration
    - Outage Management
    - Scheduling Crew & Material
    - Inspections
    - Maintenance
    - Construction
Improving GIS Readiness with Asset Data Management Process Improvement

- Pole Data Reconciliation
- Customer And Network Data Optimization (CAN-DO) Project
  - Business Process Improvement – No Technology
  - Clear Accountability and Performance Metrics
  - Innovative Ways to Fix backlogs
- Maintenance Optimization (MO)
- Maintain T&D Planning Model and Dispatch Operations Model for both EMS/SCADA and Outage Management applications
Pole Data Reconciliation

Legend
- Data input point
- System has no data available
- Data manually entered
- Data transferred from another system

FAULT DETECTION
Pole Data Reconciliation

CADOPS
- FastGate: No historical data storage; all data is entered.
- CADOPS: Customer connectivity data is entered.
- Systems are not maintained here.

RCMS
- Pole count = n
- No change to pole count
- Material posted
- No change to pole count

AFPR
- Pole count = n
- No pole data from AFPR, but pole data is entered.
- Field data is entered.

FPI System
- Field data is entered.
- Field data is entered.

JTU
- Attachment Info
- Attachment Info

CSS
- Pole count = n
- Material posted
- No change to pole count
- No change to pole count

SAP
- Pole count = n + 1
- Material posted
- No change to pole count
- Material posted

Comments
- Pole height not shown on maps, or<br>Conditions requiring correction have been<br>fulfilled by correction to pole location.
- Assume: This is a new customer.
- JTU and FPI have different<br>inspection data requirements. Pole height is also included.
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- JTU and FPI have different<br>inspection data requirements. Pole height is also included.

JTU history is deleted when facility point name<br>is retired in JTU. FPI history is also deleted.<br>Conditions requiring correction have been<br>fulfilled by correction to pole location.

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Customer And Network Data Optimization

- Prior Mixed Awareness and Importance of Connectivity Data To Outage Management and Customer Service.
- Utah Power Holiday Storm 2003 – customer information.
- Objective – Make Maintenance of Connectivity Data a Integral Part of Our Culture Across All Business Units.

- Enforce the As-Is Process
- Design and Implement the To-Be Process
- Take Care of the Backlog
Maintenance Optimization (MO)

- Geospatial display of legacy system pole inspection violations to schedule field work
  - Pole data and violations thematically mapped
  - Include T&D Network Connectivity
  - Email Directions and Maps
  - Upload Excel Information to View on Map/Route Screen
  - Vehicle Tracking – future
  - SAP linkage under investigation
- Prototype Developed by Business Unit Analyst
- Fully Supportable ESRI-based Application Development underway scheduled completion by March 31, 2006
Transmission Model Consolidation

- Subtransmission & Grid Transmission Network Model
  - Network Planning Model for Local Area Subtransmission and Grid Planning - PSS/E
  - EMS/SCADA Operating Model for Switching Studies and Planned Outages - RANGER
  - Transmission Model to improve Outage Management - CADOPS

- Leverage ESRI Front End and CIM Data Model Interface to other core applications.

- Similar plans to consolidate distribution models
Investment Plan Sequencing

Leverage New and Core Applications
- DMS Mobile Up
- DMS Trouble Up
- JAZZ
- PBC/CVO/C1 Call Guide
- Envision

GIS – Distribution Assets
- Transport Management Website

Connectivity Data Optimization

Pole Data Optimization
- Power Out
- CSS Adapterization
- Customer Directory (Rehost)

Asset Data Synchronization
- FastGate
- APPR (Facility Pt Gen)
- OMS (Facility Pt Gen)
- RCMS-CD (Facility Pt Gen)
- FPI (Facility Pt Gen)
- JTU Inventory

APP Reporting Project
- DRS
- CADOPS Adapterization
- On Demand
- PROSPER-US
- PROSPER - Business Objects to COGNOS Migration

Work Management
- RUT

Graphic Design
- RCMS-CD
- RCMS-CU
- On Demand

Joint Use Billing
- JTU
- EIS

Reporting and Data Quality

PCVMS
- Transformer DB
- Transmission Line Data

FAAR
- PC RCMS
- Estimator Toolkit
- EIS

GIS – Transmission Assets
- PLS CADD
- AutoCAD Sub
- FPI
- FPI Fielding

AFPR
- EIS
Asset Data Management Summary

- Part of overall Business Unit Technology Strategy
- Initial Focus on Data Business Process Improvement (no technology) – Clear Accountability & Metrics
- Provides Asset Data Synchronization Foundation - key building block components.
- Requires solid business processes, data integrity and synchronization as new projects are implemented.
- Builds asset synchronization, naming and location rules as IT initiatives progress.
- Reduces level of effort with each initiative as foundation has been created and tasks are repetitive.