Utility Data Model for Big Data Analytics
Oracle Corporation

**SCALE**

- $36.9B in revenue on a trailing twelve-month basis*
- #1 in 50 product/industry categories
- **$24B in R&D since 2004**
- $50B on more than 80 acquisitions
- 390,000 customers in 145 countries
- 25,000 partners
- 115,000 employees

**INNOVATION**

- 34,000 developers and engineers
- 18,000 customer support specialists, speaking 29 languages
- 18,000 implementation consultants
- 15 million developers in Oracle online communities
- 2 million students supported annually
- 900 independent Oracle user groups with 500,000 members

* GAAP revenue reported in USD as of August 31, 2012
Investment in Innovation and Integration

MORE THAN $24B IN R&D SINCE 2004

Figures in GAAP
About The Speaker

- Samuel Harrell
  - Industry Director, Utilities NA
  - Industry Business Unit
Agenda

- Industry & Business Challenges
- Big Data Platform Strategy
  - Oracle Utilities Data Model (OUDM) Implementation and Deployment Benefits
- Close & Open Discussion
• Industry & Business Challenges
Pace of Change Has Rapidly Accelerated

1980s
Database Reporting Tools

1990s
Reporting/Dashboards Web-based BI/DM

2000s
Adhoc Query/Analysis BI/DW platforms

Today
Big Data
Mobile
In-memory Analytics
Cloud
New Technologies Create Avalanche of New Information
Creating New Opportunities to Improve Business Performance

Expected Data Volume Growth of a Tier 1 IOU

- New Devices in the Home enabled by smart metering
- PCT’s Come On-line
- AMI Deployment
- Distribution Management Rollout
- GIS Upgrade
- OMS Upgrade
- RTU Upgrade
- Mobile Data Goes Live
- Advanced Distribution Automation
- Mobile Workforce Project
- Substation Automation System

End-User Data Requirements

Time

Source: Electric Power Research Institute

RTU: remote terminal unit
PCT - Programmable Communicating Thermostat
The Problem With Big Data

12% of executives feel they understand the impact data will have on their organizations.

Big Data – Are You Ready?
Utilities Face Key Challenges in Realizing Value

Information Silos: Collaborative Analytics Approach
Static Business Processes: Operational Integration of Analytics
Skill Set Gaps: Actionable Insights
Unified Information Architecture Maturity Phases

**Silos**
- One off tools/solutions
- Bottom-up
- Local business unit driven
- Many versions of truth
- Independent data marts

**Standardize**
- Enterprise standard tools/solutions
- Data warehouse and dependent data marts
- IT & LOB partnership
- Secure, consistent access to all data

**Optimize**
- Agile, flexible architecture
- Analyze “just in time” structured & unstructured data together
- Advanced analytics & real-time recommendations

**Information as a Platform**
- All stage 3 capabilities delivered as a platform (service/cloud)
- Access of tools and data among broad subscriber group

**Maturity & Capability**
Why Should Utilities Care?

Value

Time

Past (Reactive)

Future (Proactive)

Descriptive

Diagnostic

Predictive

Prescriptive

• Preventative Action
• What-If Scenarios
• Forecasting

• Optimizing Real-Time Operations

• Reports
• KPI Dashboards
• Ad-hoc Queries

Field Workers

Managers

Executives

Customers

Business Value of Enterprise Analytics: Connect, Empower Users and Transform the Business
• Big Data Platform Strategy
Solution Stack for Big Data

Technology Perspective

STREAM
- Event Processing
- Apache Flume
- Real-Time Data

ACQUIRE
- HDFS
- Oracle NoSQL Database
- Enterprise Applications

ORGANIZE
- Hadoop (MapReduce)
- Big Data Connectors
- Data Integration

ANALYZE
- Data Warehouse
- In-Database Analytics
- Industry Data Models

DECIDE
- Analytic Applications
- Visualization
**Oracle Utilities Data Model**

**Technical Architecture**

### Data Sources
- CIS/CRM
- Social
- Work Mgmt
- Asset Mgmt
- Meter/Device
- Network
- ERP
- ETRM
- Weather
- GIS/Spatial
- Other

### OUDM Key Components:
- Pre-built, CIM-based designed and optimized for Oracle DB and hardware
- Use in any applications environment and is easily extensible and customizable
- Foundation for BI and analytics infrastructure
  - 3rd Normal Form (3NF) CIM-based
  - Foundation Layer with reference & base transactions
- Analytical Layer with Aggregates, OLAP Cubes, Pre-built Mining Models
  - Intra ETL Exchange, Extensive BI Metadata
  - Over 670 tables with over 4,800 columns; and 1,300 industry measures and 80 KPIs
- Presentation Dashboards & Sample Reports

### Partner Value-Add (Xtensible Solutions):
- Data integration services
- Pre-built application connectors
- Additional analytical reports, models, etc.

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CIM and Enterprise Transformation
Driving Value From Big Data

Enterprise Data Management
- Accurate
- Reliable
- Credible
- Timely
- Complete
- Appropriate

Integration & Process Excellence
- Real-time
- Event-driven
- Centralized
- Action Oriented
- Reusable
- Flexible

Advanced Analytics & Decision Support
- Operational Decision Orientation
- Sophisticated
- Proactive
- Cross Functional
Oracle Utilities Data Model
Implementation Flexibility – Enterprise Scale

**Oracle Industry Data Model**
(3NF)

- Foundation Layer Extensions
- Sample Star Schemas
- Intra-ETLs
- Sample OBIEE Content

**Application Integration**
- Productized or Custom Connectors to Non-Oracle Applications
- Information Cleansing and Staging
- Master Data Management
- Use of Productized Connectors
- Development of Productized Connectors to Oracle Applications

**Customer, SI, Dev Partner Offerings**

**Oracle Offerings**

**Analytics Development**
- Custom Star, OLAP, Mining Models
- Custom Dashboards & Reports
- Role Definition
- Guided Analytics
- Use of Productized Reports, Dashboards

**Custom, SI, Dev Partner Offerings**
Partner Solutions
Focus on Data Management & Data Integration
Partner Solutions
Focus on Advanced Analytics

CIS
CRM
Work Mgmt
Asset Mgmt
Meter/Device
Network
ERP
ETRM
Weather
GIS/Spatial
DMS/OMS
EMS/SCADA
Historian
Others

Internal & External Utility Data Sources

MD3i Suite

Event Processing Engine
Master Data Management
Enterprise Service Bus
ETL/EII Engine
Big Data Connector

Oracle Utility Data Model (OUDM)

Enterprise BI & Analytics Platform

OFI Design Artifacts

Foundation Layer
Analytic Layer
Presentation Layer
• Closing Remarks
Roadmap For Innovation & Transformation

1. SIMPLIFY
Systems and processes to reduce cost, increase control, and provide platform for better decisions

2. STANDARDIZE
Business processes, procedures, accelerate user adoption, improve quality and accuracy of data

3. CENTRALIZE
Data, processes, systems and decisions, common data definition across business for cross domain analytics

4. AUTOMATE
Whenever possible with integrated event driven business processes, collaborative best practices
Big Data Opportunities in the Connected Car

Learning From Other Industries

Big Data Opportunities in the Connected Car

Real time monitoring and remote diagnostics on ongoing basis will have direct cost-avoidance/savings potential in warranty claims

Warranty Claims

Reduce claims-to-premiums ratio leveraging real time information from the vehicles can help measure its exposure to risks such as when, where and how long it was driven.

Insurance Telematics

Utilize vehicle sensor data for early fault detection, service alerts, monitor emissions & driver behavior monitoring (teenage drivers)

Safety & Security

Smart Route Guidance and Navigation, Cabin personalization based on driver profile

Productivity & Navigation

Location-sensitive playlists by mashing podcasts, music or news. Develop personalized ad campaigns and alerts based on vehicle location.

Location Based Services
Questions
Presenter Contact Information

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