



Oracle Utilities Partner Summit

ORACLE®

UTILITIES



Oracle Network Management System - Overview

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Electric Distribution Operations

- **Objective:** Operate the electric distribution network in a safe and reliable manner.
 - Restore Outages due to
 - Storms
 - Network damage
 - Avoid overloads during peak conditions
 - Perform planned maintenance and track safety measures



Operational Applications

- **Outage Management (OMS)**
- **Distribution Management (DMS)**
- SCADA
- AMR/AMI
- Mobile Dispatch



Outage Lifecycle

Customer



Outage call received from customer

Call Agent



- Oracle CC&B
- CIS
- IVR
- Call Overflow

Updates to cust. for subsequent calls
or for other cust. on same outage

Outage info. automatically passed to OMS

Automatic info. updates to CSR

Dispatcher/ Operator



- Oracle NMS
- Outage Analysis
- List Assignment
- Outage completion

Dispatch to Field

Crew

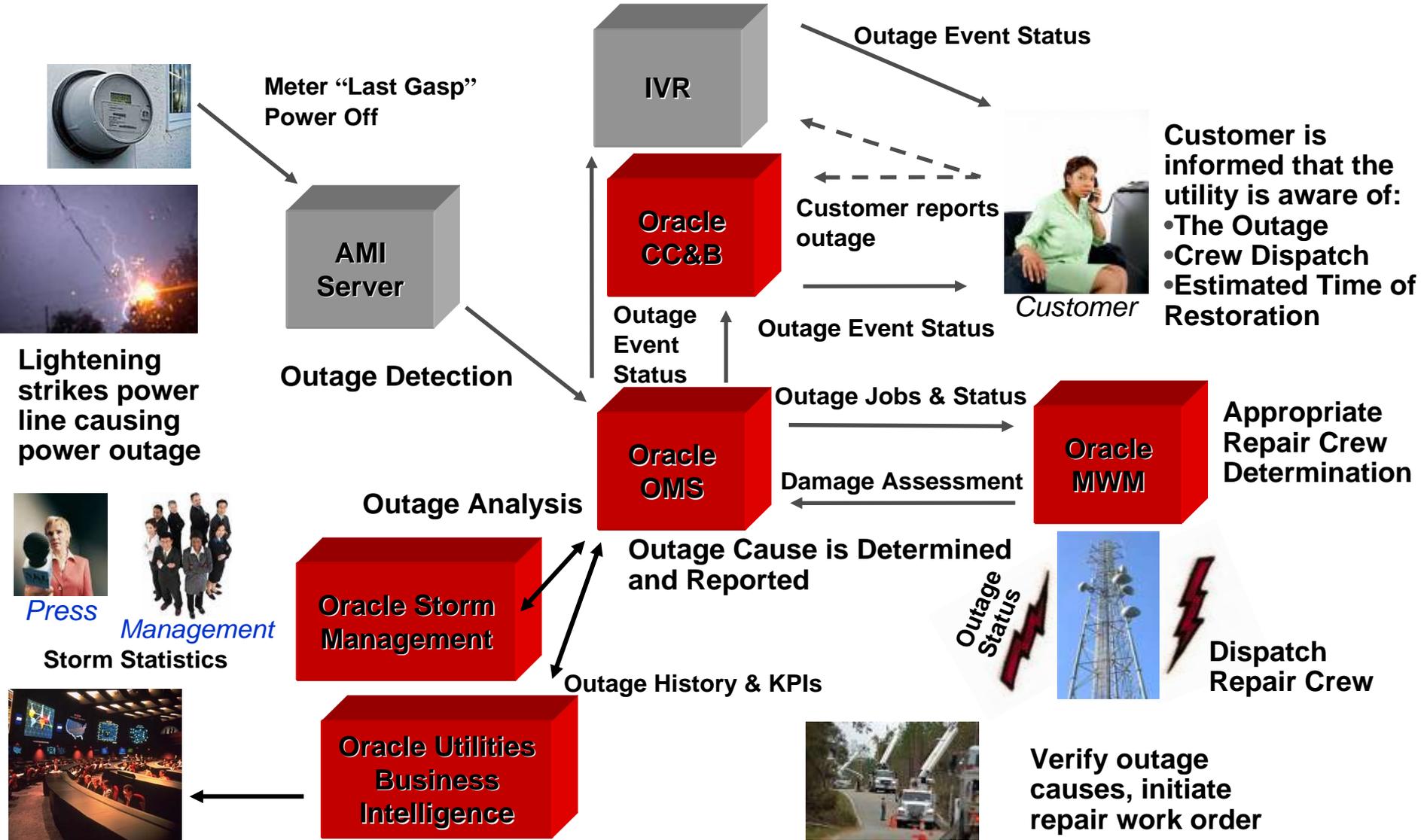


- Voice dispatch
- Oracle MWM Dispatch
- Other Mobile Systems

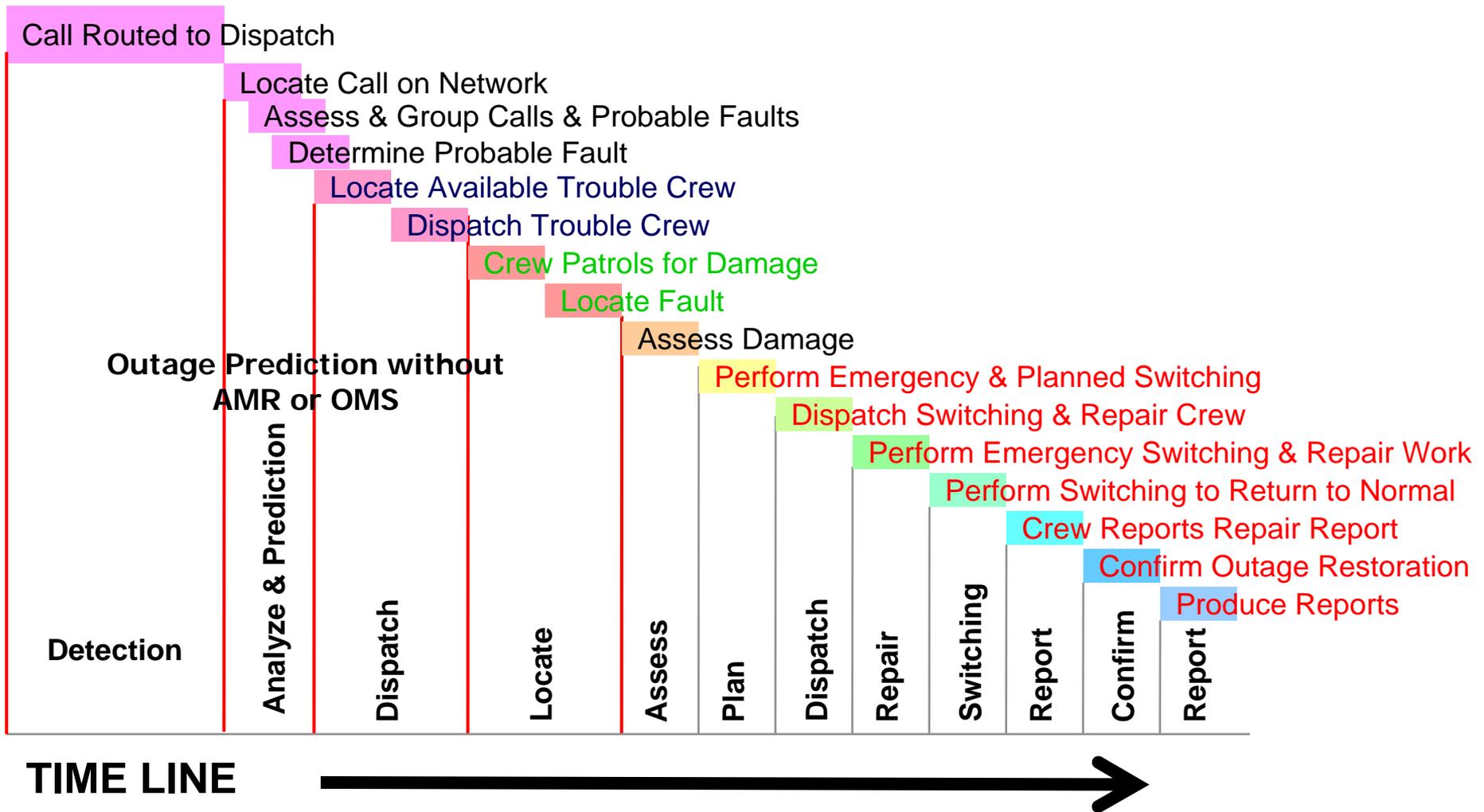
Updates from field



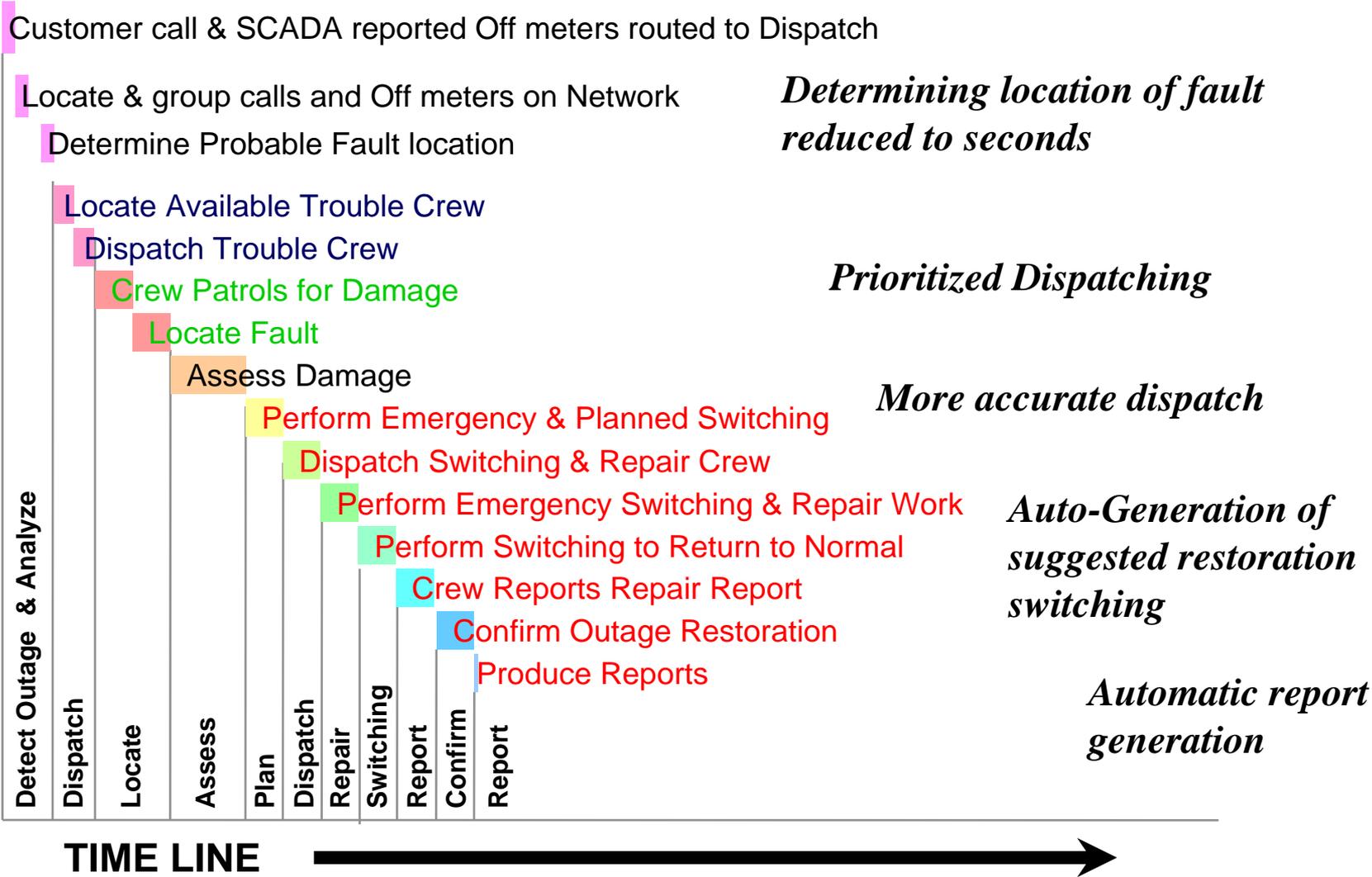
Integrated Business Process in Action



Outage Management without OMS

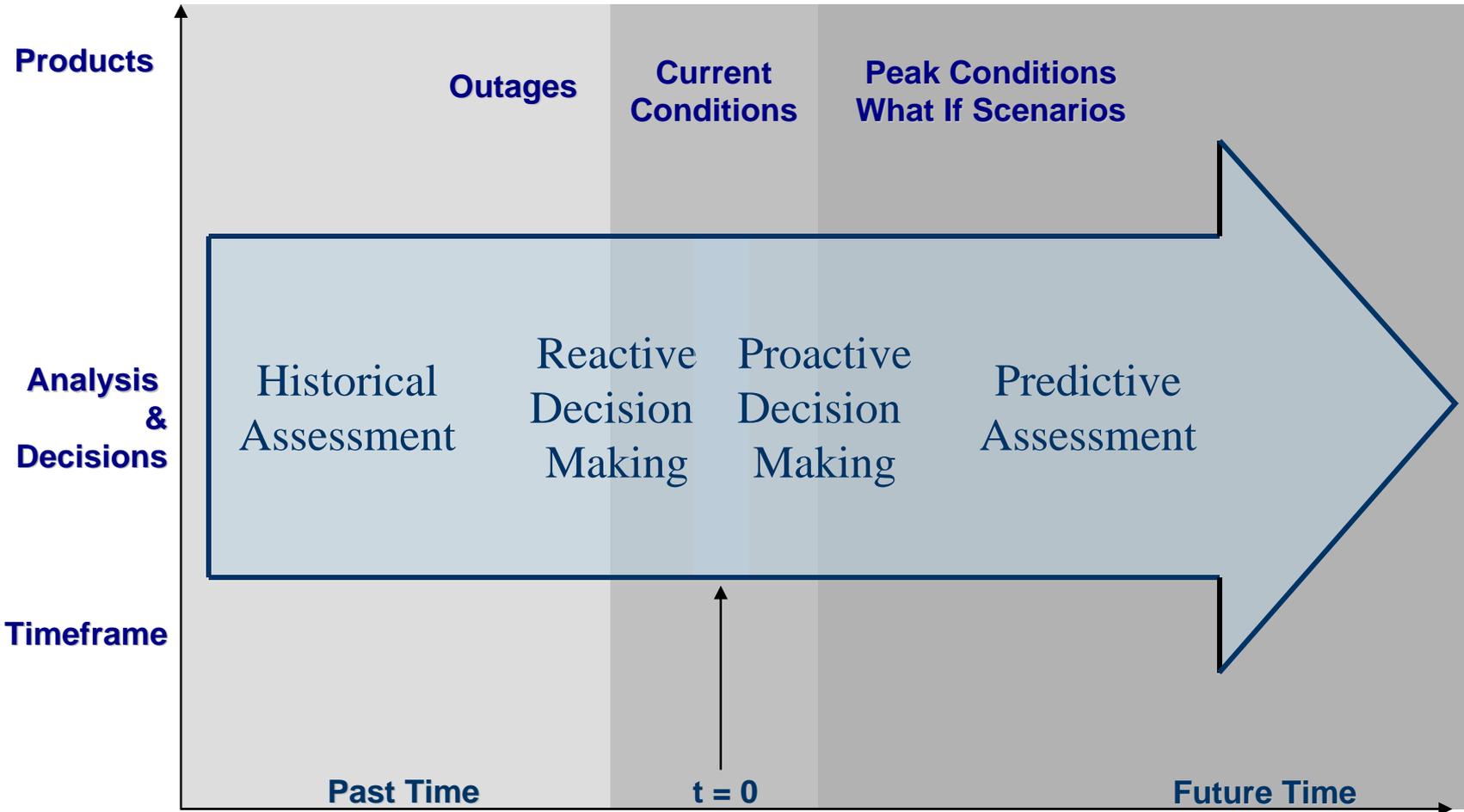


OMS Enabled Outage Management



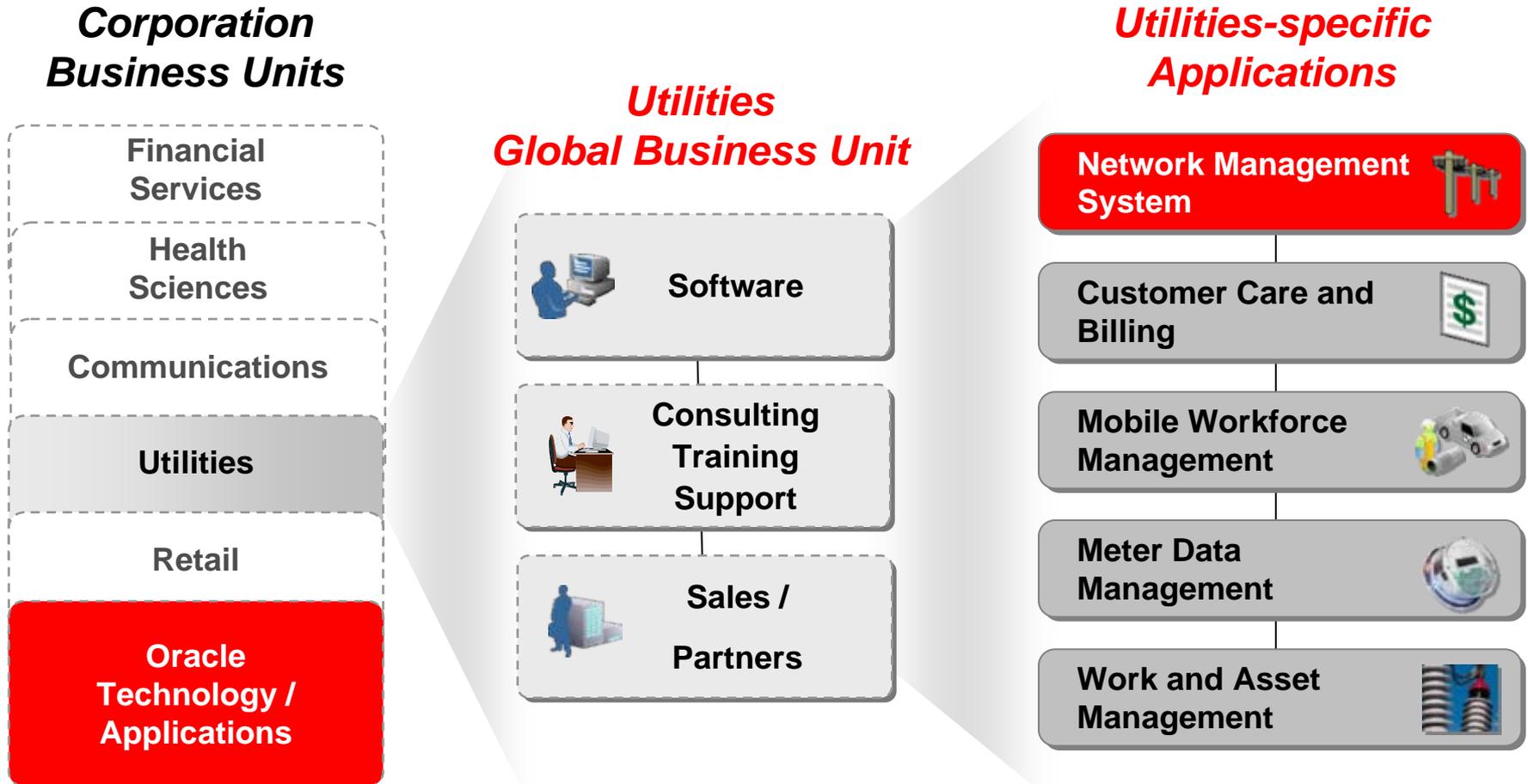
From Reactive to Proactive

Ops Objectives: Act faster, act smarter



Oracle Utilities at a Glance

A Global Business Unit of Oracle Corporation



Oracle Utilities NMS

- Oracle Utilities Outage Management System (OMS)
 - Call Taking
 - Analyze inputs for predicted outage locations and customers
 - Outage Status Tracking, feedback to Call Agents
 - Dispatching of crews/resources
 - Tracking of outage times, customers, work and causes
- Oracle Utilities Distribution Management System (DMS)
 - Switch Plan tracking (Emergency and Planned)
 - Powerflow analysis to assist in switching decisions
 - Suggested Switching to automatically calculate switching options for Restoration/Isolation
 - Volt/Var Optimization analysis – Loss minimization

The #1 OMS Product In The Market

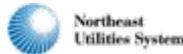


Source: Gartner

As of March 2008

Outage Management Customer Showcase

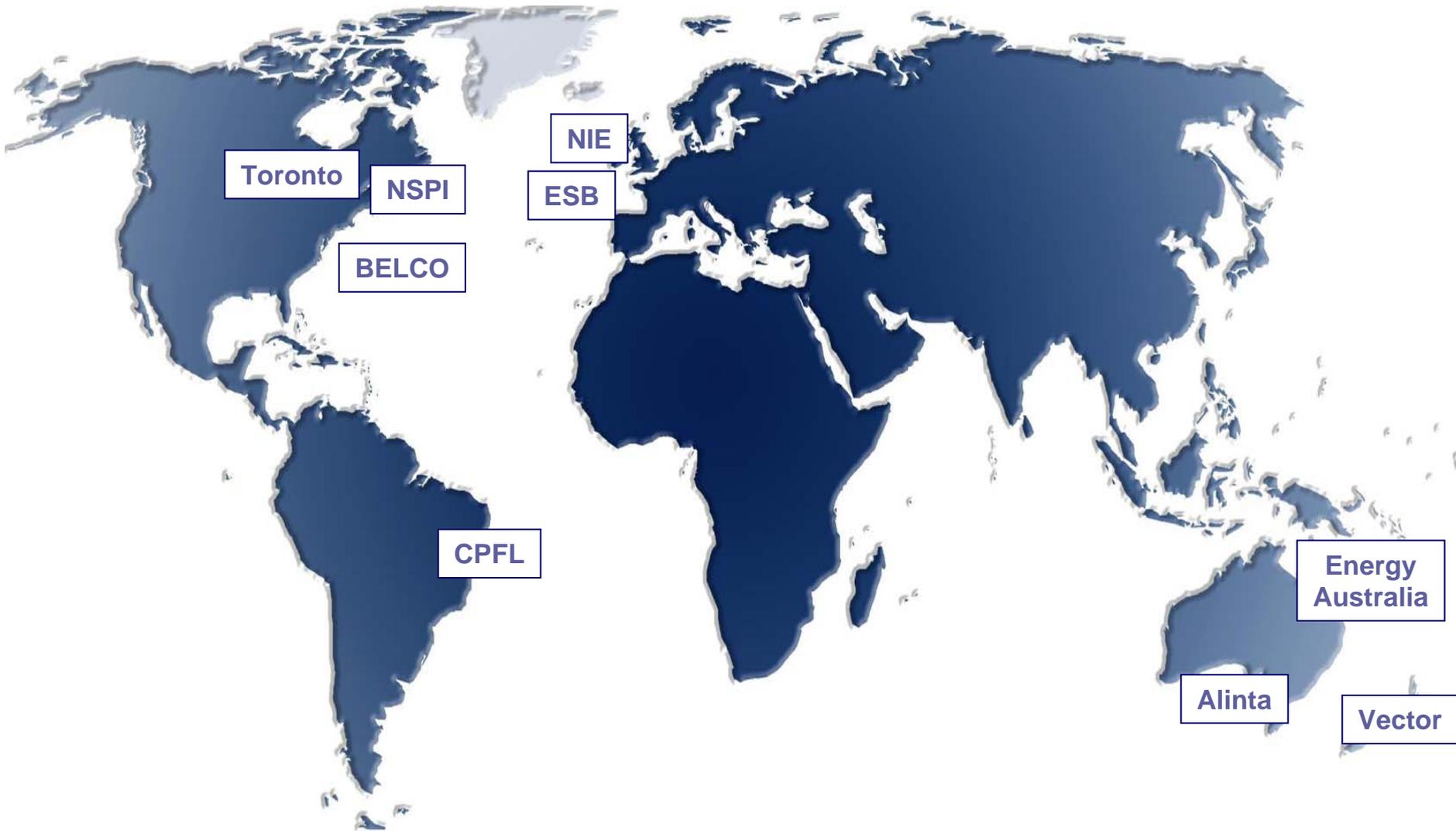
1. Alinta (AUS)
2. Atlantic City Electric
3. Baltimore Gas & Electric
4. Bermuda Electric Light Company
5. Centerpoint Energy
6. Cincinnati Gas & Electric Company
7. Connecticut Light & Power
8. Consolidated Edison
9. CPFL (Brazil)
10. Delmarva Power & Light
11. Duke Energy
12. Electricity Supply Board (IRL)
13. Energy Australia
14. Energy United
15. Georgia Power Company
16. Gulf Power Company
17. Hawaiian Electric Company
18. Idaho Power Company
19. Interstate Power
20. Iowa Electric Service
21. Kansas City Power & Light



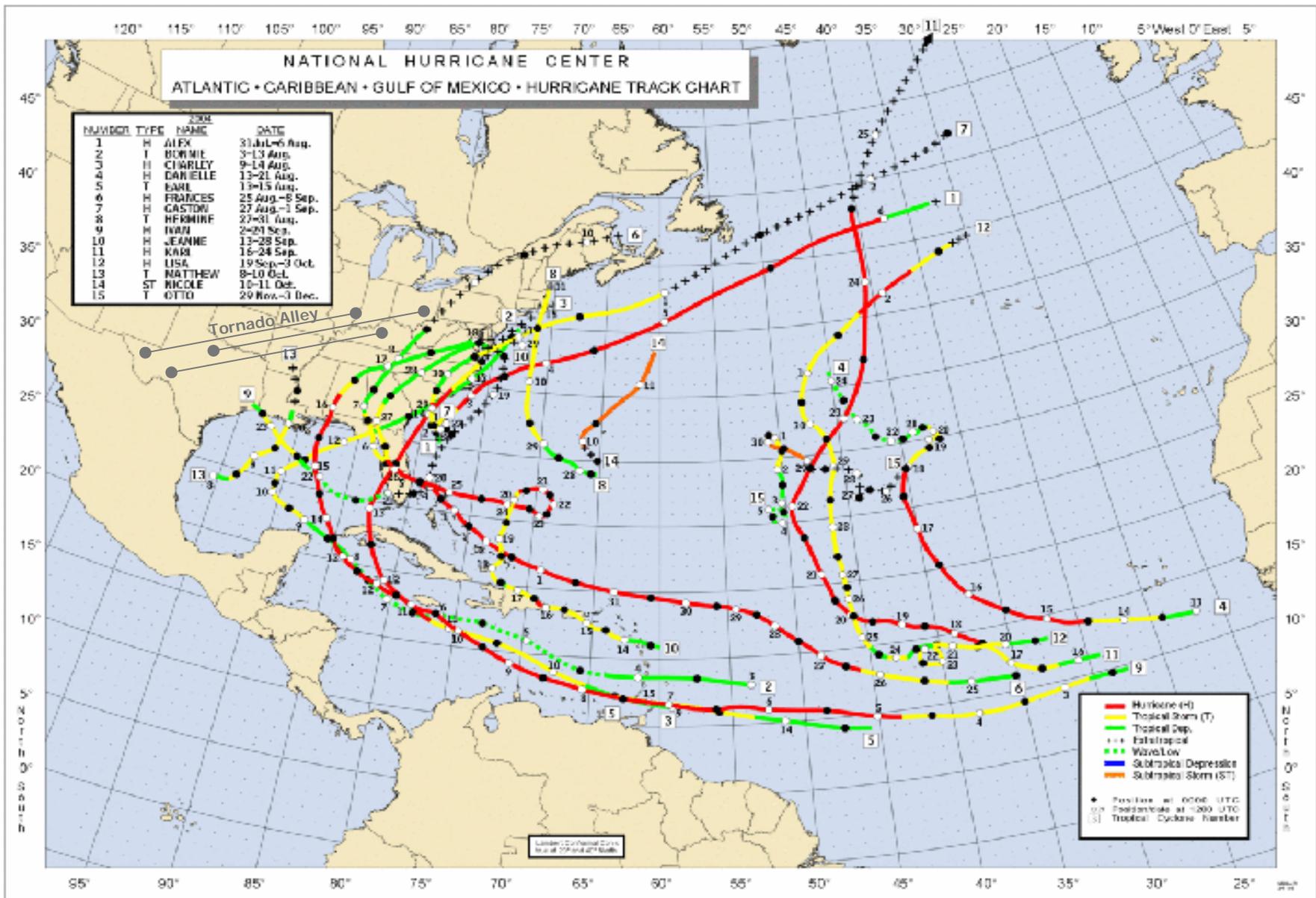
22. Kentucky Utilities
23. Louisville Gas & Electric
24. Mid-Carolina Electric COOP
25. Mississippi Power
26. Northern Ireland Electric (IRL)
27. Northern States Power Company
28. Nova Scotia Power
29. Potomac Electric Power Co
30. Public Service Company of CO
31. Public Service New Mexico
32. Rappahannock Electric Cooperative Inc.
33. Sam Houston Electric Co-op
34. Savannah Electric & Power Company
35. South Carolina Electric & Gas
36. Toronto Hydro
37. United Illuminating
38. Vector (NZ)
39. Western Mass Electric Company
40. Wisconsin Power & Light



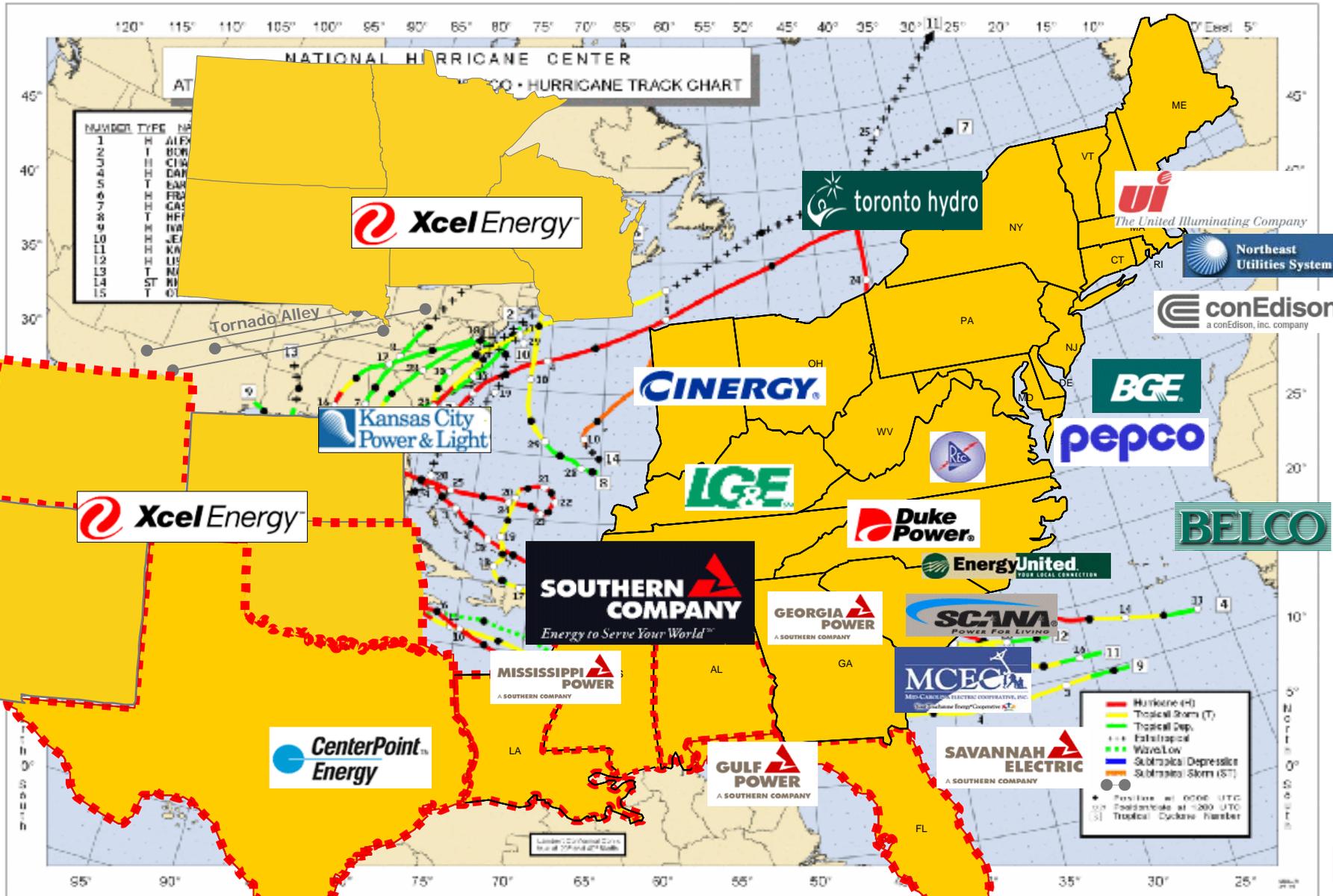
International Oracle NMS Customers



Outage Management Customer Showcase



Outage Management Customer Showcase



Oracle NMS Case Study



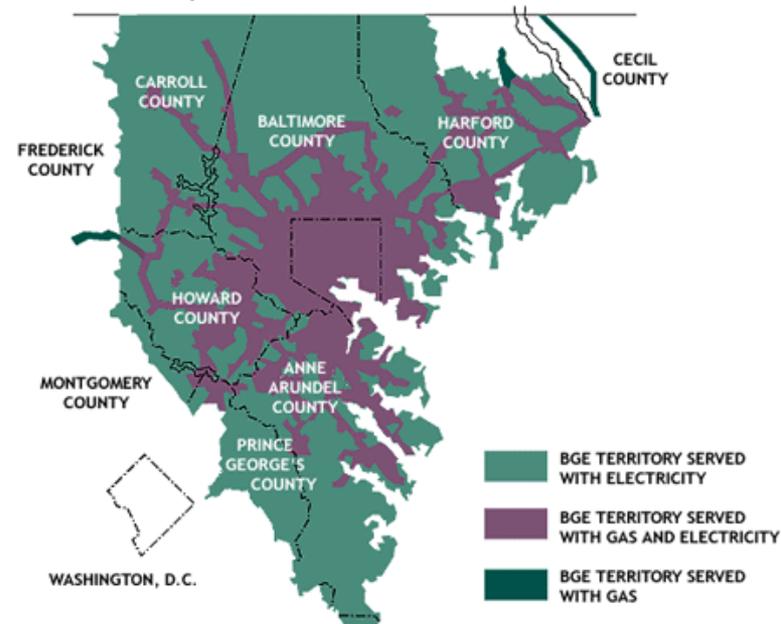
Statistics:

- Customers Served: **1,100,000**
- Network Area: **2,300 Square Miles (3,400Sq.km)**
- D/T Lines: **22,000 Miles**

Project Profile:

- Installed: **2003** **2008**
- Oracle NMS Release: **1.6.1.4** **1.7.5**
- Max Full Client Users: **60**
- Max Exec. Dashboard Users: **100**
- Max Calls/hr: **40,000**
- Max dev ops/hr: **300**
- Operating Environment: **HP-UX, Oracle, Smallworld**

Service Area Map



*“With the Oracle NMS solution we are able to **pinpoint where problems are on our network**, which in turn helps us **more effectively prioritize work and optimally dispatch our crews**. “The system allows us to **better serve our customers** because we can provide them with accurate information about the length of time it will take to restore power, as well as providing timely feedback on the cause of the outage and the dispatch and crew assignment information.”*

Ken DeFontes, President & CEO

Oracle NMS Case Study



Experience with Hurricane Isabelle: “the system paid for itself during Isabelle.”

- 790,000 customers out
- over 80 people on the system at any one time
- over 23,000 individual jobs
- Restored power in 8 days to all the affected customers

BGE believes it was at least two days shorter than if they did not have Oracle NMS

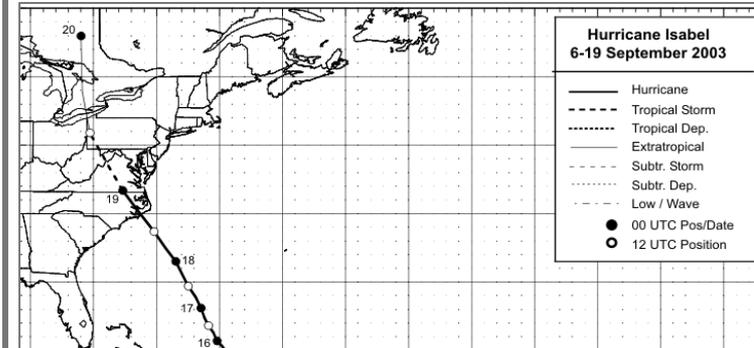


Table 1. Storm Comparison

	Isabel	Floyd
Duration	8 days	8 days
Customers Affected	790,000	503,000
Phone Calls	712,000	290,000
Cases of Trouble	23,612	16,000
Total Personnel	6400	3300
Poles replaced	450	350
Transformers	306	210



BGE recently went live with Oracle Utilities NMS Release 1.7.5.

One of the major improvements was verbose switching steps as documented actions for safe and secure operations.

Switching Management module has enabled a fully paperless environment for submitting, preparing and executing Switch Sheets with the NMS for planned and unplanned outages.

Oracle NMS Case Study



Statistics:

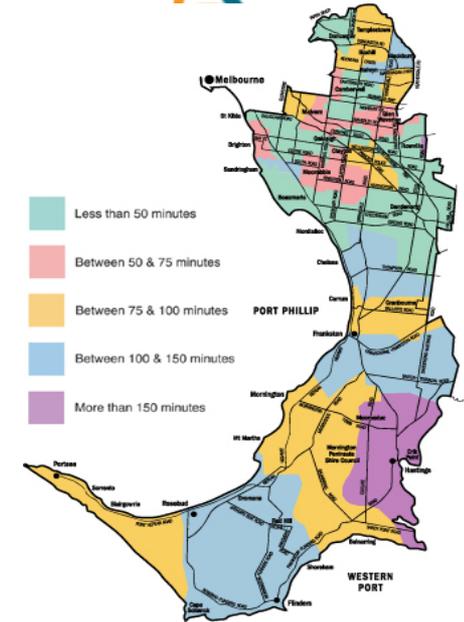
- Customers Served: **600,000**
- Network Area: **2,300 Square Miles (3,400Sq.km)**
- D/T Lines: **5,000 Miles**

Project Profile:

- Installed: **1999 (1.6.1.4 H), Upgraded 2008 (1.7.10)**
- Network: **Gas, Electric**
- Number of Users: **30**
- Operating Environment: **IBM/AIX, Oracle**

Assisted Oracle Utilities with the definition and development of automated Fault Location, Isolation and Service Restoration (FLISR). Identifies faulted sections in the field via SCADA integration.

Automatically prepares switching steps and issues actions via SCADA. Allows Alinta to avoid sustained outages by completing restoration actions within 1 minute, treating these events as momentaries.



NMS 1.8.1 - Outage Management Footprint

App Module

Interface Adapter

OMS Standard Edition

Model Management

US Electric Ops Model

US Standard Configuration

Operator's Workspace

Trouble Management

High Availability

Redliner

GIS Adapters
 ✓ ESRI
 ✓ Intergraph
 ✓ Smallworld

OU Adapters
 ✓ CC&B
 ✓ MWM

Generic Adapters
 ✓ IVR
 ✓ CIS

OMS Enterprise Edition - OMS SE +

Switching Management

Schematics

Generic MQ Adapters

✓ CIS
 ✓ CIS Callback
 ✓ IVR
 ✓ Mobile
 ✓ WMS

Generic Adapters

✓ AMR

OMS BI

Storm Reporting

Switching Reporting

Analytics Portal

Trouble Reporting

NRT & Historical Extractors

OMS Schema

OMS KPI

Business Intelligence Framework

OMS Web Client

Web Workspace

Web Trouble

OMS Storm

Storm Management

OMS Call Center

Web Call Entry

Web Callbacks

Call Overflow Adapter
 ✓ 21st Century

OMS SCADA

SCADA Extensions

SCADA Adapters

✓ ICCP Blocks 1&2
 ✓ ICCP Block 5
 ✓ Generic SCADA

OMS Paging

Service Alert

NMS 1.8.1 - Distribution Management Footprint

App Module Interface Adapter

DMS Standard Edition

Model Management	US Electric Ops Model	US Standard Configuration	High Availability
Operator's Workspace	Switching Management	Redliner	GIS Adapters ✓ ESRI ✓ Intergraph ✓ Smallworld

DMS Enterprise Edition - DMS Standard Edition +

Power Flow Extensions	Suggested Switching	Schematics
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DMS Advanced Applications

Fault Location, Isolation & Service Restoration	Volt/Var Optimization
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DMS BI

Switching Reporting
Feeder Load Analysis Portal
NRT & Historical Extractors
DMS Schema & KPI
BI Framework

DMS SCADA

SCADA Extensions
SCADA Adapters ✓ ICCP Blocks 1&2 ✓ ICCP Block 5 ✓ Generic SCADA

Oracle NMS DMS Customers

- Customers with Switching Management Implemented

- CPFL



- ESB



- NIE (1999)



- Toronto Hydro (1997)

- ▶ Toronto Hydro



- ▶ Our operators run “what if” scenarios to make sure switching plans and other network actions are safe and optimized. North York Hydro (now part of Toronto Hydro) reported a 25% drop in aborted switching operations as a result of switching management

- Alinta



- BGE



- E.ON



- SCANA



- Pepco



- Power Flow & Suggested Switching:



Oracle DMS Functionality

- Switching
- Suggested Switching
- Powerflow
- Overload Relief
- Volt/VAR Optimization

Load Restoration Plans

Restoration Switching Plans

Plan	No of Steps	Feeder Capacity	Volt Viol Perf Ind	Conductor Perf Ind	Switch Vio Perf Ind	Xfmr Viol Perf Ind
1	3	152.3	0.0	0.0	0.0	0.0
2	3	-30.7	0.0	0.0	0.0	0.0
3	5	346.2	0.0	0.0	0.0	0.0
4	5	96.1	0.0	0.0	0.0	0.0
5	5	281.1	0.0	5959.5	0.0	0.0
6	3	-96.6	0.0	4847202.8	0.0	0.0

Show Steps... Generate Switch Plan Insert Steps Into Switch Sheet Exit

Switch Sheet Editor

File Edit Steps Actions

Plan # 1071 Type Planned Feeder Safety Clearance 1006 Events 20503 (Master) 20504 (Planned) Add Event Rem. Event

Rev 2 Status In Progress

Crew ID	Event #	Contact	Mobile #	Pager #	ASN/DSP Date	Status	Type
Trouble-02	20503	Bruce	5550123	5550123	04/11/05 17:06:30	DSP	Trouble

Refresh Crew List

Request Contact Tracking Audit Log Steps Hide Crew List

Step	Subnum	Rev	Description	Details	Status	Instructed By	Instructed Date	Instruct
1	1	1	Close disconnect_oh_8939 [ABC]	Create a parallel on feeders [2213 2221]	Aborted	ces5		
2	1.1	2	Close disconnect_oh_006503 [ABC]		Completed	ces5	04/11/05 16:21:55	
3	2	1	Open disconnect_oh_990045 [ABC]	Break a parallel on feeders [9043 2213]	Completed	ces5	04/11/05 16:22:11	
4	3	1	Open disconnect_oh_990047 [ABC]	Break a parallel on feeders [9043 2213]	Completed	ces5	04/11/05 16:22:18	
5	4	1	Place Safety Flag disconnect_oh_990047					
6	5	1	Place Safety Flag disconnect_oh_990045					
7	6	1	ISSUE Clearance #1006					
8	7	1	Replace pole					
9	8	1	RELEASE Clearance #1006					
10	9	1	Remove Safety Flag disconnect_oh_990045					
11	10	1	Remove Safety Flag disconnect_oh_990047					
12	11	1	Close disconnect_oh_990047 [ABC]	Energize a section of the network.				
13	12	1	Close disconnect_oh_990045 [ABC]	Create a parallel on feeders [2213 2221]				
14	13	1	Open disconnect_oh_8939 [ABC]	Break a parallel on feeders [2213 2221]				
15	13.1	2	Open fuse_oh_F988912 [C]	Deenergize a section of the network.	Completed	ces5		

Record On Add Insert Delete Move Show Address Rows Instruct Complete Abort Action Failed Exit

Product Architecture – OMS / DMS

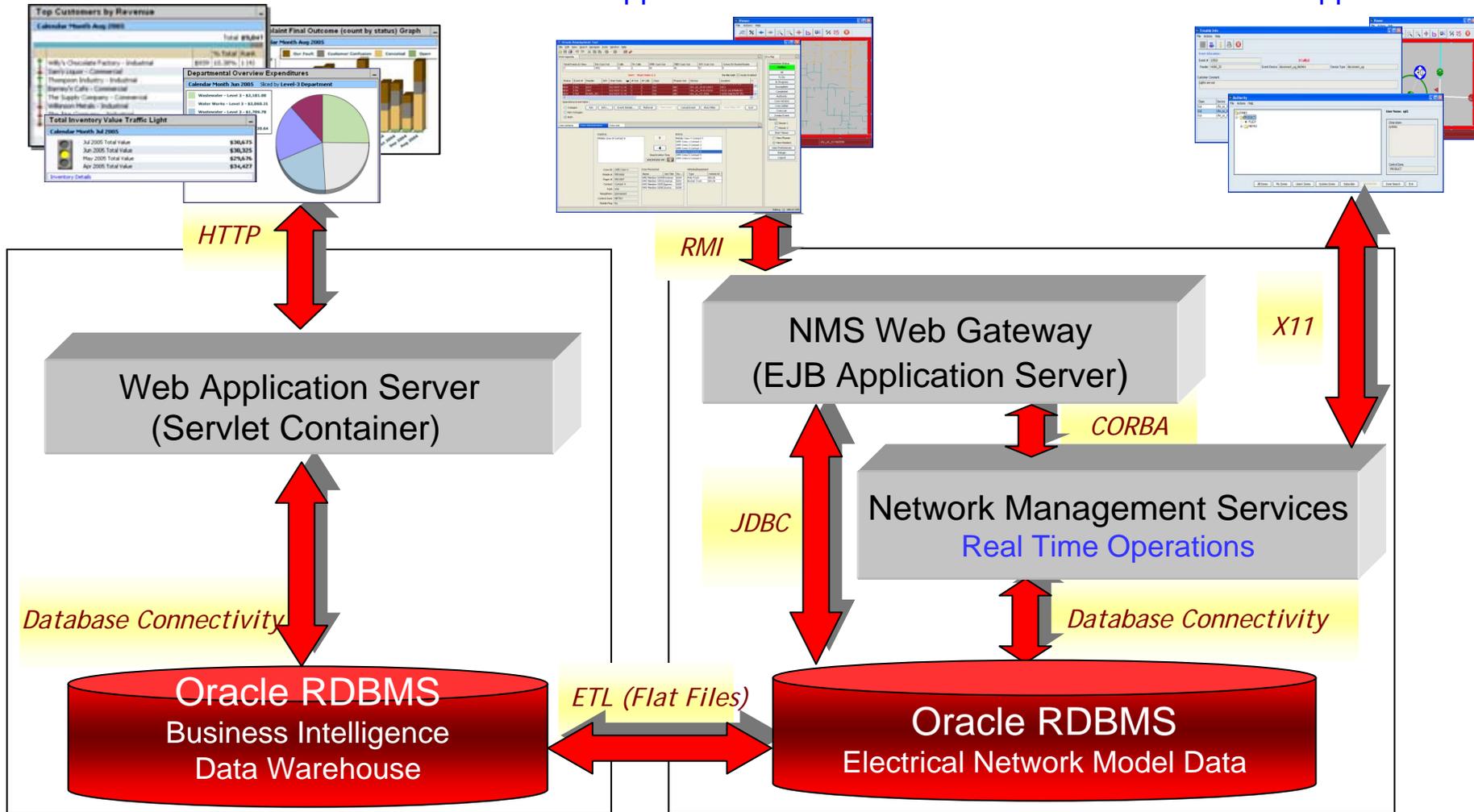
- Single Electric Operations Model
- Persistent Data Store is the Oracle RDBMS
 - Configuration Parameters
 - Connectivity & State
 - Business Intelligence – Oracle Data Warehouse
- Common OMS/DMS System Services
 - Database Access, Object Naming Service
 - Dynamic Data, Connectivity, Outage Analysis (Jobs)
 - Power Flow Engine
- Applications subscribe for information needs
 - Pub/Sub with system services

NMS Architecture - Overview

Business Intelligence

Java (Swing)
Client Applications

Control Room
Client Applications



Oracle NMS – Dispatcher Environment

Crew Actions

Full Operations

Mobile Crew 7 OMS Crew 1 OMS Crew 2 OMS Crew 3 OMS Crew 4 OMS Crew 5 OMS Crew 6
Show All Crews

New... Edit... Locate Crew View Availability... Assign En Route Ensite Active Job Info... Crew Info... Filter... Switching... Exit

Work Agenda

Help

File Sort Filter Actions

Auto Filter Auto Filter Off
 Audio Disabled To Do List Filter -> Default

Color Enabled Sort -> Default

Status	Event #	Feeder	E/H	Start Date	# Out	# Calls	Clues	Phases Out	Device	Location	Crew	Est Restore Time	Est Src	Pred Type
NEW	6776	11521		12/06/07 14:09	1296	4	Out	ABC	disconnect_oh_990122	11521		12/12/07 20:16:2	S	Revised Pred
NEW	6906	11532		12/06/07 14:11	1284	8	Out	ABC	disconnect_oh_960111	11532		12/12/07 20:16:2	S	Revised Pred
NEW	6978	1322		12/06/07 14:12	1210	2	Out	ABC	disconnect_oh_15581	1322		12/12/07 20:03:2	S	Revised Pred
NEW	6780	6854		12/06/07 14:10	1152	11	Out	ABC	disconnect_oh_5155	6854		12/12/07 20:03:2	S	Revised Pred
NEW	6873	PAPA_08		12/06/07 14:10	1100	5	Out	ABC	disconnect_oh_5022-1	PAPA_08		12/12/07 20:03:2	S	Revised Pred

Ad View Info... Event Details... Switching... Referral... Send To Mobile Incomplete Cancel Event Exit

VIEW1 (Feeder Mode)

Help

File View Navigate Options

14 partitions loaded.

Summaries Misc. Tools

FLISR Tools

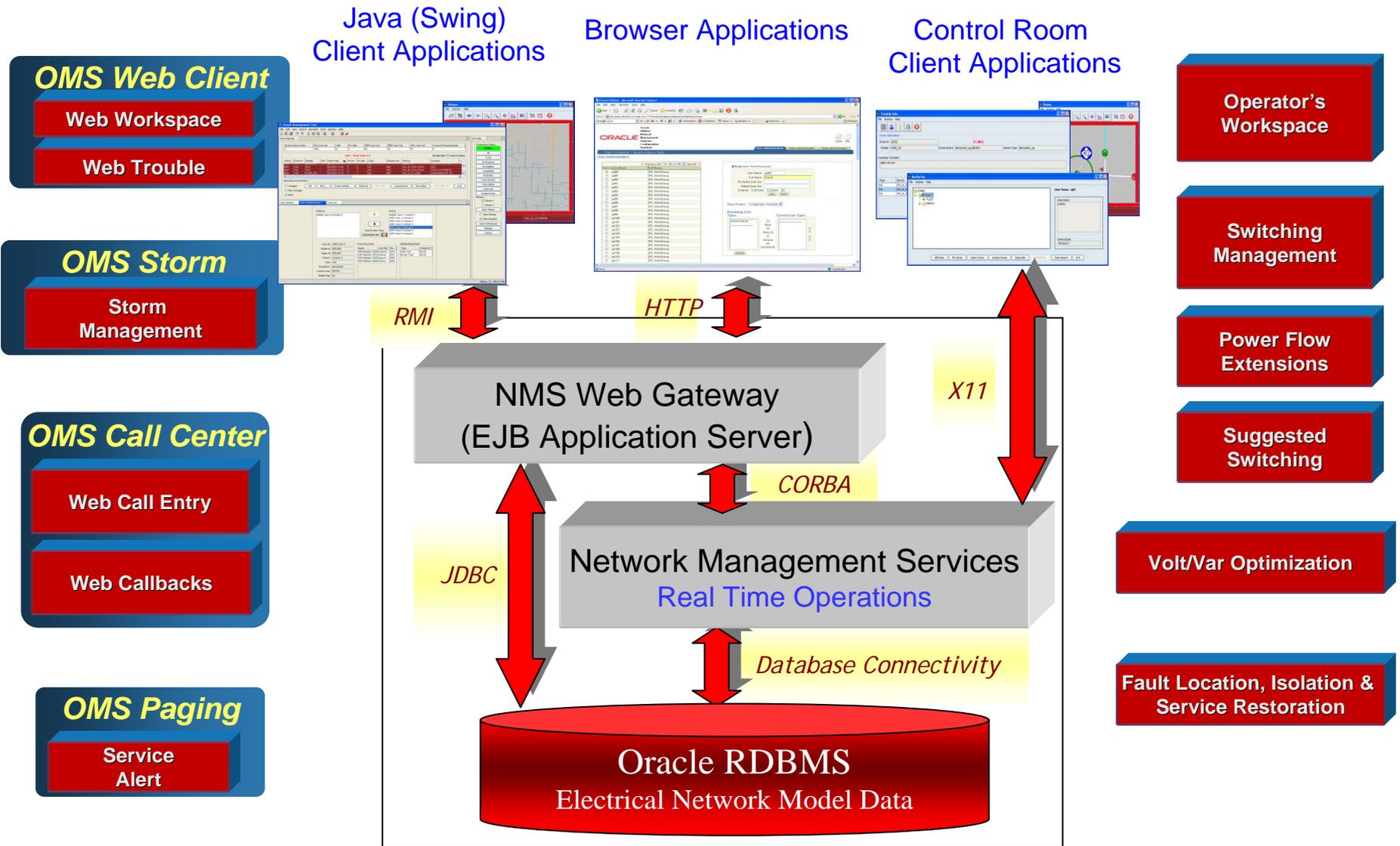
Viewers

VIEW1 VIEW3 VIEW4

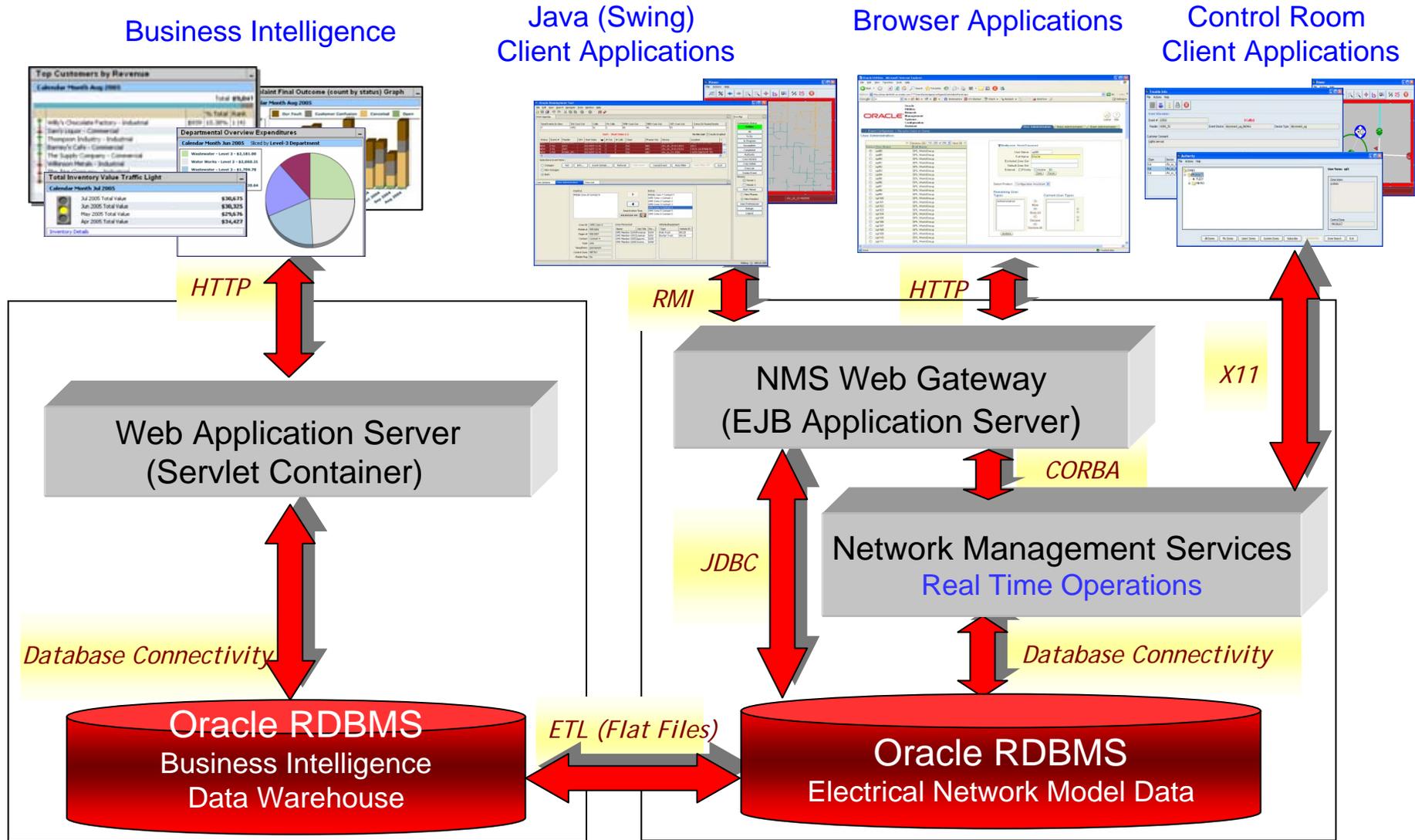
Start Viewer
View Phases
View Feeders

Help
Refresh Apps
Logout

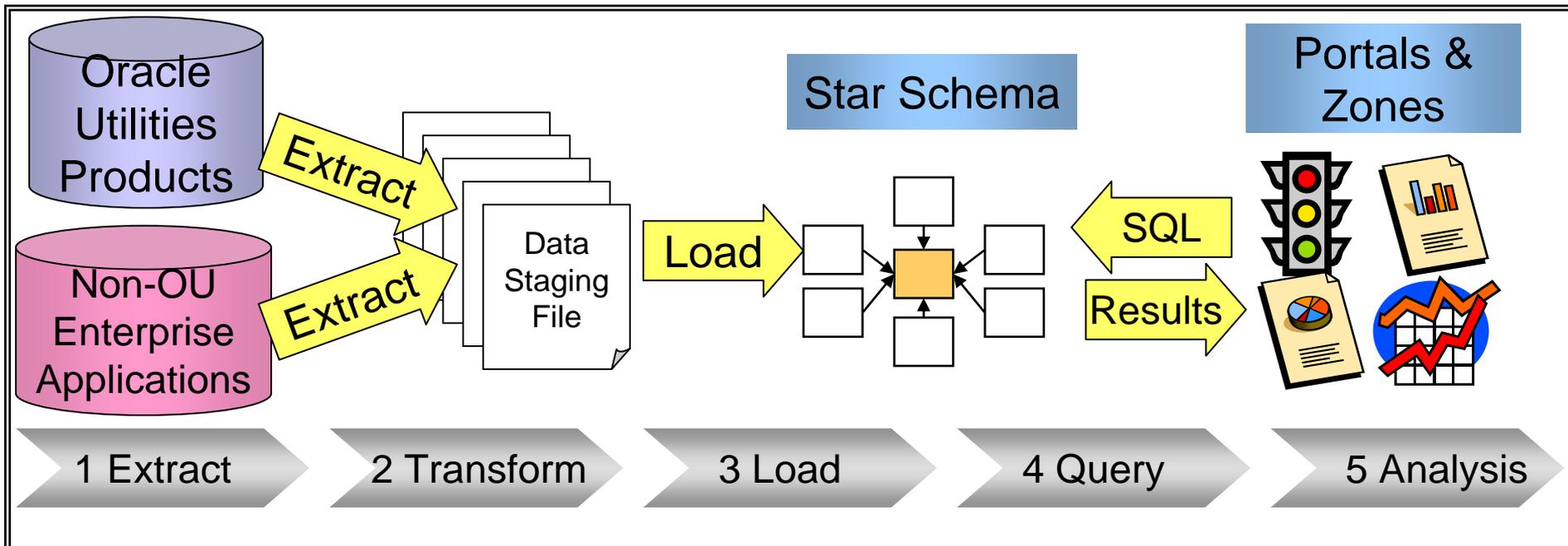
NMS Architecture - Overview



NMS Architecture - Overview

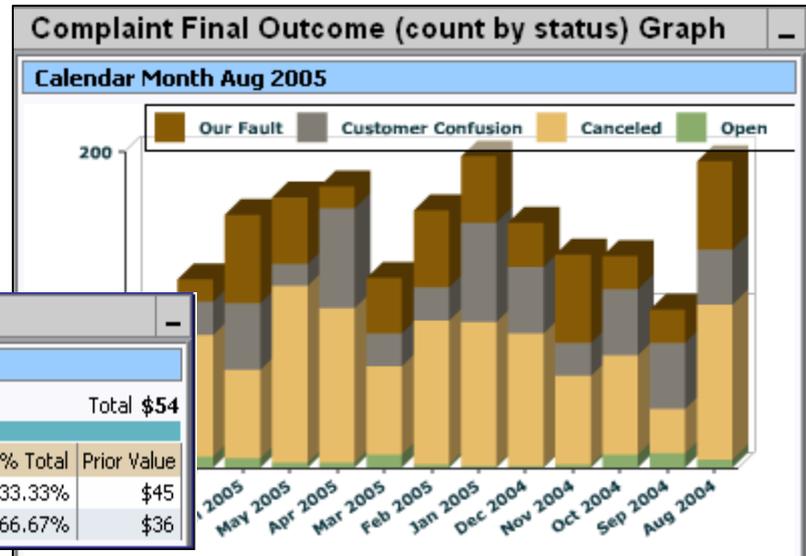
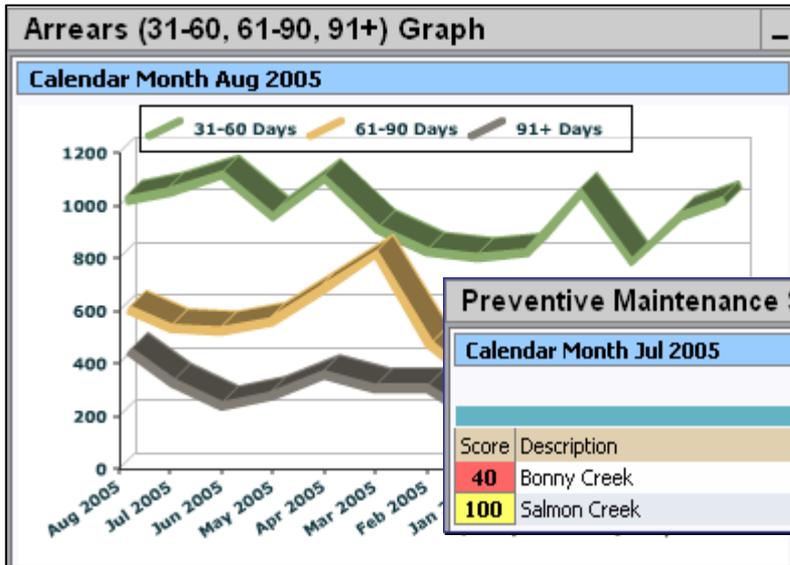


BI consists of ETL, a Star Schema and a GUI



- Oracle Utilities Business Intelligence consist of:
 - Programs and triggers to extract data from the source system (e.g., CC&B, EAM,OMS, non-Oracle Utilities applications)
 - Rules to load the star schemas in the Oracle Utilities data warehouse with the extracted data (using Oracle Warehouse Builder)
 - Graphical Services to support querying of the data in the star schemas

Business Intelligence Visual Metaphors

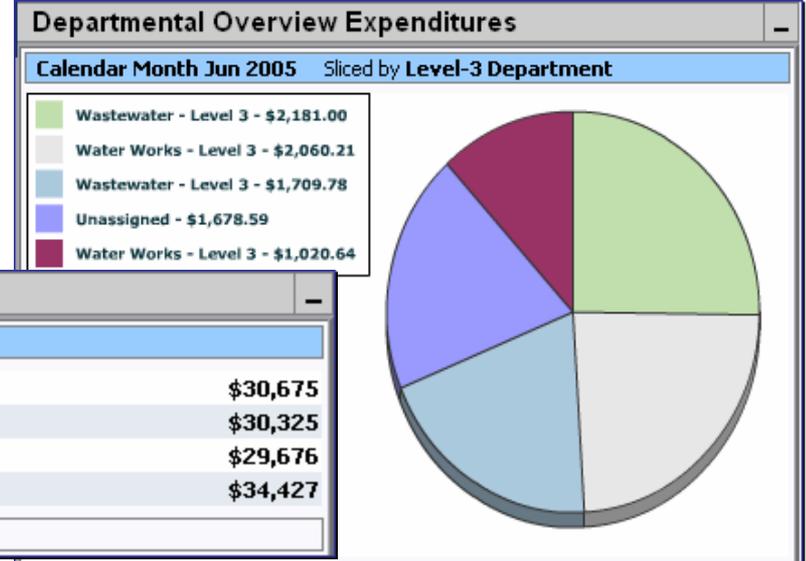


Preventive Maintenance Score Card

Calendar Month Jul 2005

Total \$54

Score	Description	Current Value	% Total	Prior Value
40	Bonny Creek	\$18	33.33%	\$45
100	Salmon Creek	\$36	66.67%	\$36



Top Customers by Revenue

Calendar Month Aug 2005

Total \$9,047

		% Total	Rank	
▲	Willy's Chocolate Factory - Industrial	\$939	10.38%	1 (4)
▼	Sam's Liquor - Commercial			
▲	Thompson Industry - Industrial			
▼	Barney's Cafe - Commercial			
▲	The Supply Company - Commercial			
▼	Wilkinson Metals - Industrial			
▲	The Tire Company - Industrial			
▼	Charles River Associates - Commercial			
▲	Mike's Glass Works - Industrial			
▼	Systems Programming Limited (PLC) - Commer			

Total Inventory Value Traffic Light

Calendar Month Jul 2005

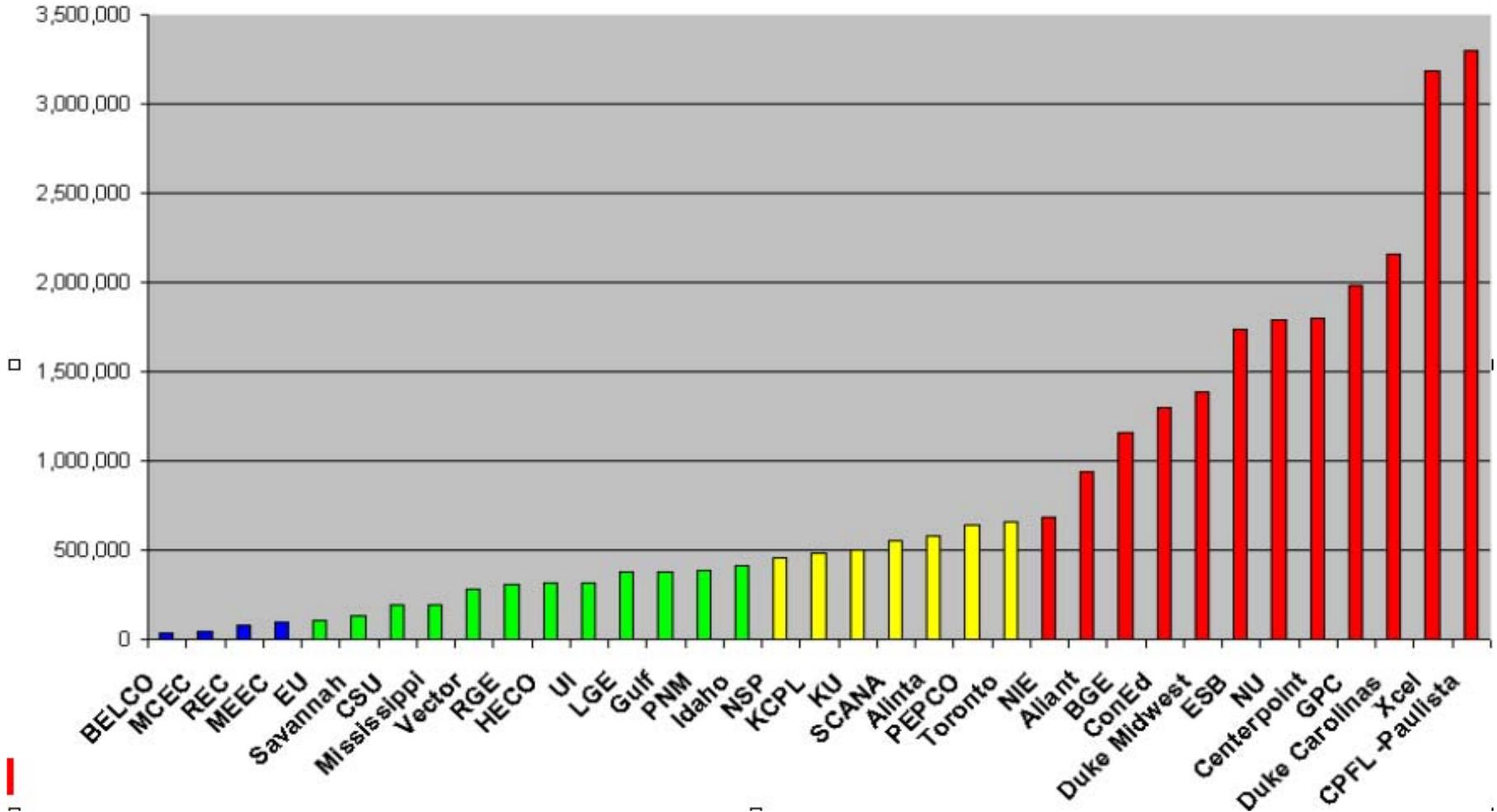
Jul 2005 Total Value	\$30,675
Jun 2005 Total Value	\$30,325
May 2005 Total Value	\$29,676
Apr 2005 Total Value	\$34,427

[Inventory Details](#)

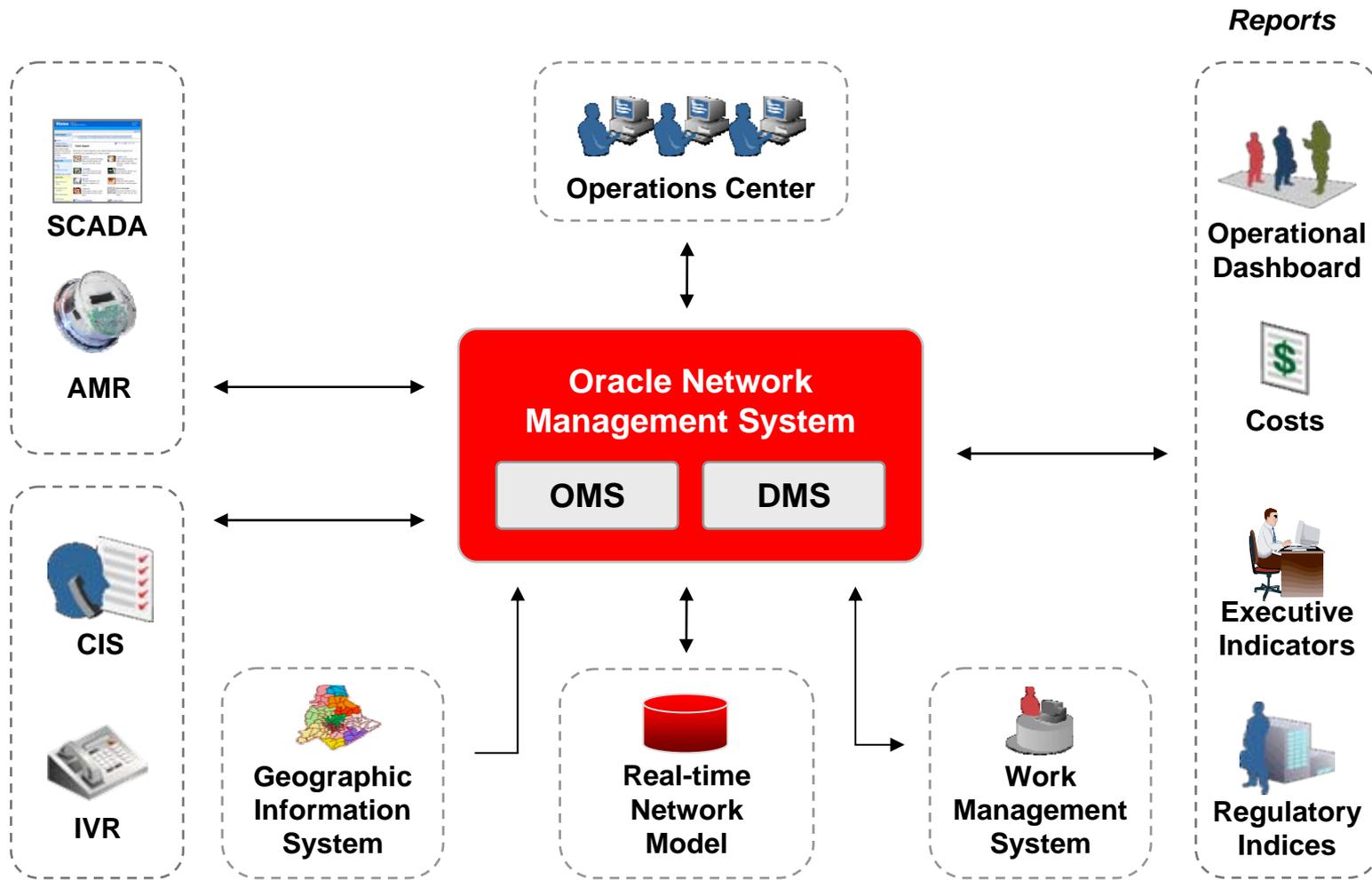
Performance & Scalability

- Each Year PEPCO Certifies OUNMS to PUC
- Certifies the system as “Storm Ready”
- Simulates:
 - Major Storm Event (Hurricane Isabel) – captured calls.
 - Injects calls to NMS
 - Simulates Operations Users
 - Viewer Focuses, Map Loads/Unloads
 - Crew Dispatches
 - Device Operations (Open/Close)
- Actual Users
- Measures Wall Clock Times

Oracle NMS Customer Installation Sizes



Technology & Solution Architecture



SCADA: Supervisory Control And Data Acquisition
AMR: Automated Meter Reading

CIS: Customer Information System
IVR: Interactive Voice Response

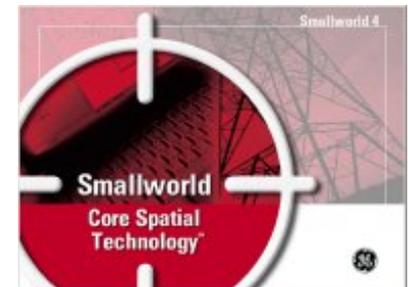
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Pre-built Integration Adapters

- GIS

- Standard Adapters and processes for major platforms

- ESRI
- Intergraph
- Smallworld



UGBU Product Integration Adapters

- CC&B Adapter
 - Oracle Shared Table Constructs
 - Materialized Views
 - Stored Procedures
 - Call Input, Outage Status
- MWM
 - Web Services exchanging XML documents
 - Over 30 data flows
 - Outage Events to MWM
 - Either NMS or MWM can be the dispatch environment
 - Crew Management

Pre-built Integration Adapters

- CIS/IVR Generic Adapter
 - Support incoming calls
 - Outage status (customer as part of existing outage, crew dispatched, ERT)
 - Callbacks
- HVCA – Twenty First Century Communications
 - Trouble calls (Customer calls) from TFCC
 - Callback request from Oracle OMS when the outage is restored
 - Callback response from TFCC

Pre-built Integration Adapters

- **Generic MQ Adapters.** Oracle Utilities NMS offers versions of its generic integration adapters that can be used with IBM WebSphere MQ Series middleware. These include adapters for:
 - Customer Information Systems (CIS) / CIS Callbacks
 - Interactive Voice Response (IVR)
 - Mobile Workforce Management (MWM)
 - Work Management Systems (WMS)

Pre-built Integration Adapters

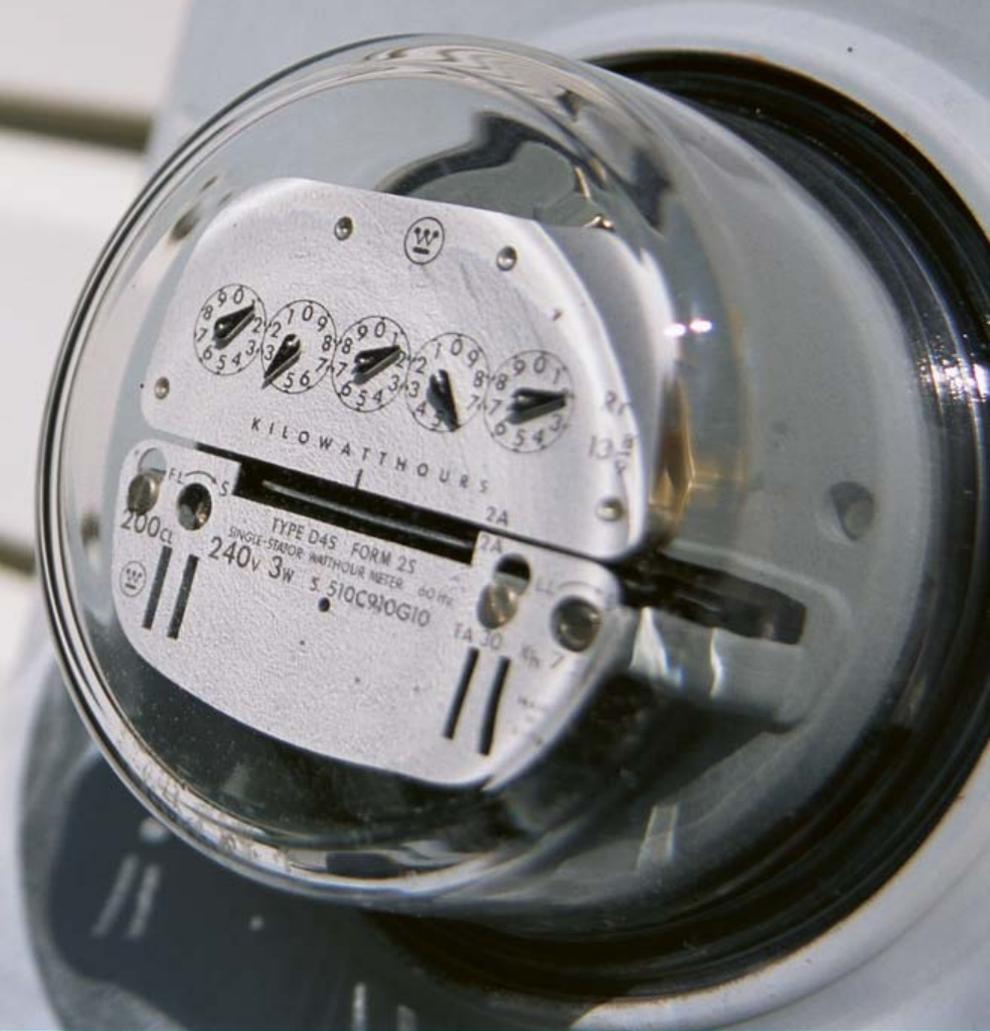
- SCADA
 - Support for ICCP Blocks 1,2 (1-way) & Block 5 (2-way)
 - Generic Adapter
- NMS AVL Web Services Integration
 - Supports One-Way Data Flow
 - Location
 - Direction
 - Speed
- AMI Adapter
 - Supports Outage detection, verification, and restoration



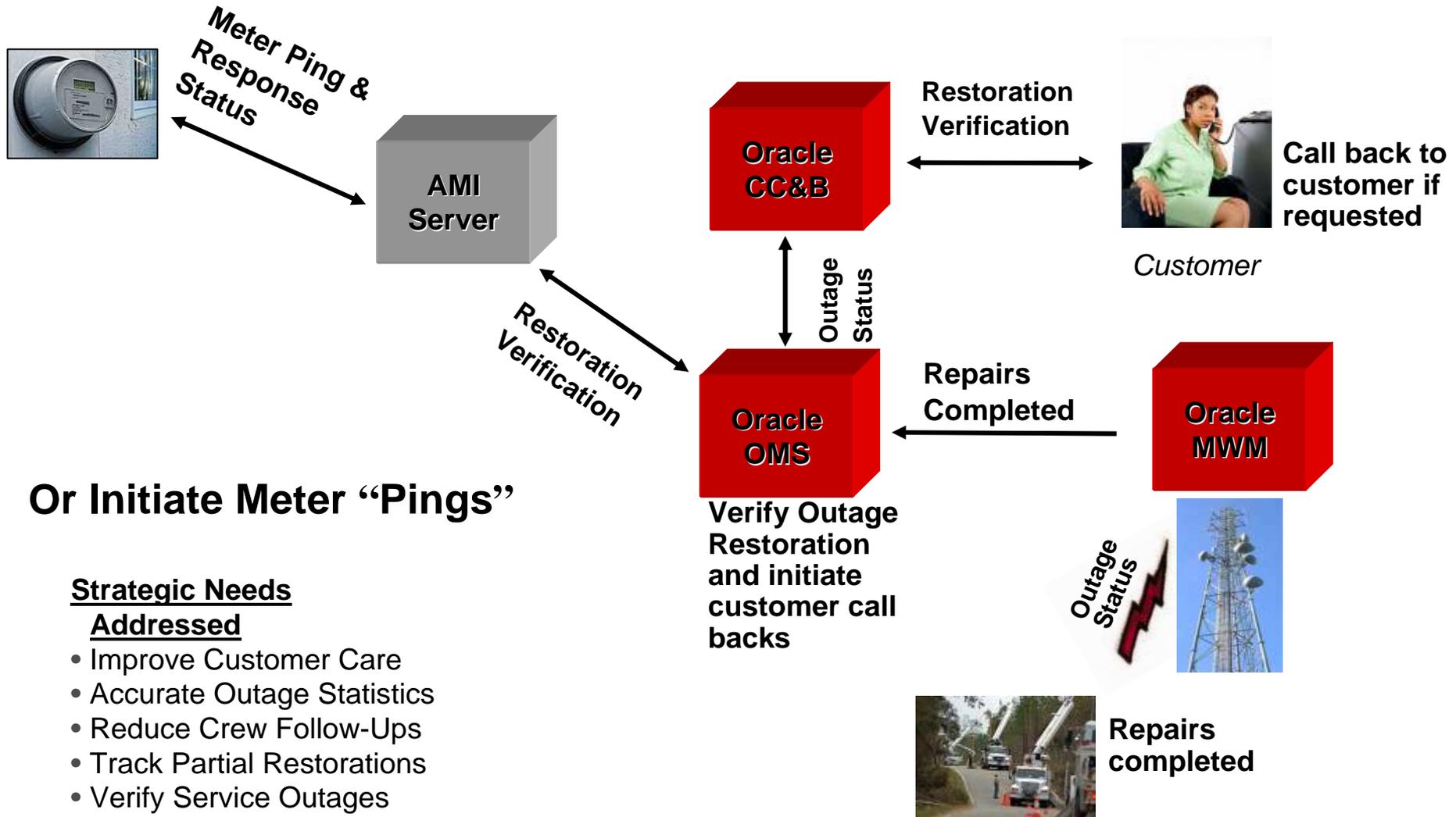
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UTILITIES

Q&A



Integrated Business Process in Action



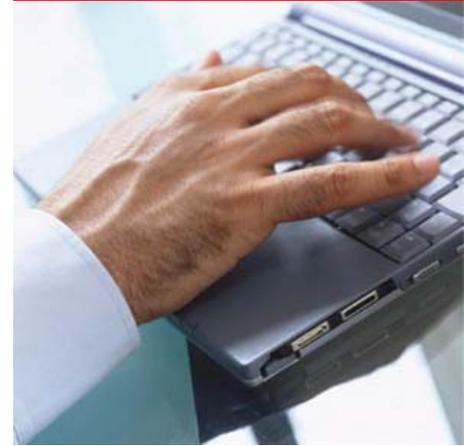
Or Initiate Meter “Pings”

Strategic Needs Addressed

- Improve Customer Care
- Accurate Outage Statistics
- Reduce Crew Follow-Ups
- Track Partial Restorations
- Verify Service Outages

Agenda

- Fault Location Isolation & Service Restoration:
 - Why FLISR?
 - What is FLISR?
- FLISR Operational Requirements:
 - What does it do?
- FLISR Operational Scenario:
 - How does it work?
- Demonstration





Fault Location, Isolation & Service Restoration

Why FLISR?

- Mandated by the Australia Victoria Government.
- Service Reliability Targets: Per customer, of unplanned interruptions
 - Less than 1.2 sustained outages per year.
 - Less than 1.06 occurrences of supply lost for longer than 1 minute
 - Less than 1.21 times of supply lost for less than 1 minute
- Financial Incentives for Reliability:
 - Urban customers with more than 9 interruptions of one minute or longer in a calendar year are credited \$80.
 - If the reliability of supply exceeds agreed target, the maximum allowed revenue dollars are increased.
- Developed, delivered, and in production in 2006 at Alinta Energy, Melbourne, AU
- Custom application integrated tightly with the Alinta's Distribution Management System from Oracle



Fault Location, Isolation & Service Restoration

What is FLISR?

- Fault Isolation and Restoration software application is integrated with distribution automation
 - Determine and execute fault isolation
 - Determine and execute best practice service restoration
 - Switch actions execute closed loop without interaction
 - Complete Alinta's event sequence objective of 60 seconds
- Determination of actions is managed within the Oracle Distribution Management System
- Automated execution is managed by the Oracle DMS
- Execution results are detailed within the Oracle DMS



FLISR Operational Requirements

What does it do?

- Fault Isolation and Restoration software application
 - Process protection trips of SCADA switches (CBs and ACRs).
 - Accurately locate fault.
 - Determine isolation steps given a tripped breaker status and fault indication status.
 - Isolate the fault using SCADA control devices
 - Automatically generate restoration steps
 - Determine approximate KVA flow
 - Determine feeder tie capacity
 - Identify KVA overloads and feeder margins
 - Restore service to affected customers using SCADA control devices
 - Complete Alinta's event sequence objective in 60 seconds

FLISR Operator's Environment

- Oracle Utilities NMS Work Agenda window
 - Work Agenda window displays FLISR status of each outage
 - Work Agenda event number color indicates the FLISR status
 - Yellow event # color indicates FLISR executing
 - Green event # color indicates FLISR successfully identified isolation and restoration plan safely without any devices limit overloads
 - Blue event # color indicates FLISR identified isolation and restoration plan with resulting device limit overloads

FLISR Feeder Visualization

VIEW1 (Feeder Mode)

File View Navigate Options Help

1100 Customers Remain Out

Switching Pairs

- Open Isolation Switch 17781
- Close Tie Switch 003936
- Picks Up 596 Customers

Switching Pairs

- Open Isolation Switch 990139
- Close Feeder Breaker 2213
- Picks Up 694 Customers

Feeder focus mode is ON

10	10	1	BR_R-2213 FLISR
11	11	1	BR_R-2241 FLISR
12	12	1	disconnect_oh_17
13	13	1	disconnect_oh_17
14	14	1	BR_R-2241 FLISR
15	15	1	disconnect_oh_00
16	16	1	disconnect_oh_00
17	17	1	BR_R-2241 FLISR
18	18	1	BR_R-2241 FLISR
19	19	1	BR_R-2241 FLISR
20	20	1	BR_R-2241 FLISR

Full Operations

ORACLE

Unack Events

Unack Non-Outages

FLISR Mode: Manual

All

To Do

In Progress

Incomplete

Complete

Authority

Crew Actions

Crew Admin

FLISR

Disable

Manual

Automatic

FLISR Disable Summary

FLISR Conditions

FLISR Simulation

FLISR Simulation Reset

Exit

VIEW1 VIEW3

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