

# Pulse

IBM SolutionsConnect 2013

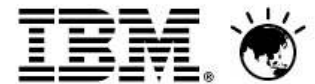


Electric  
Gas  
Water

## World Tour: Maximo Customers and a look at Trends in Utilities

*Terry L. Saunders, IBM Worldwide Utilities Industry Leader*

*June, 12, 2013 - Maximo for Utilities*





# Challenges in the Utilities Industry





# Asset Management Evolution

- New methodologies and systems align with new management focus
- PAS 55 and ISO 55000 raise the bar
- Risk-informed decision making
- Integrate finance, operations, safety, risk management
- Align strategy with asset management

## ***Build:***

- Managing growth

## ***Operate & Maintain:***

- Efficiency and cost control
- Operations processes
- ERP, EAM Enterprise Asset Management

## ***Build, Reinvest, Dispose:***

- Reliability and long term sustainability
- Lifecycle optimization
- Asset management as a discipline: PAS 55
- IT/OT convergence
- EAM, Analytics, Asset Optimization, Predictive Reliability

1950

1960

1970

1980

1990

2000

2010

2020

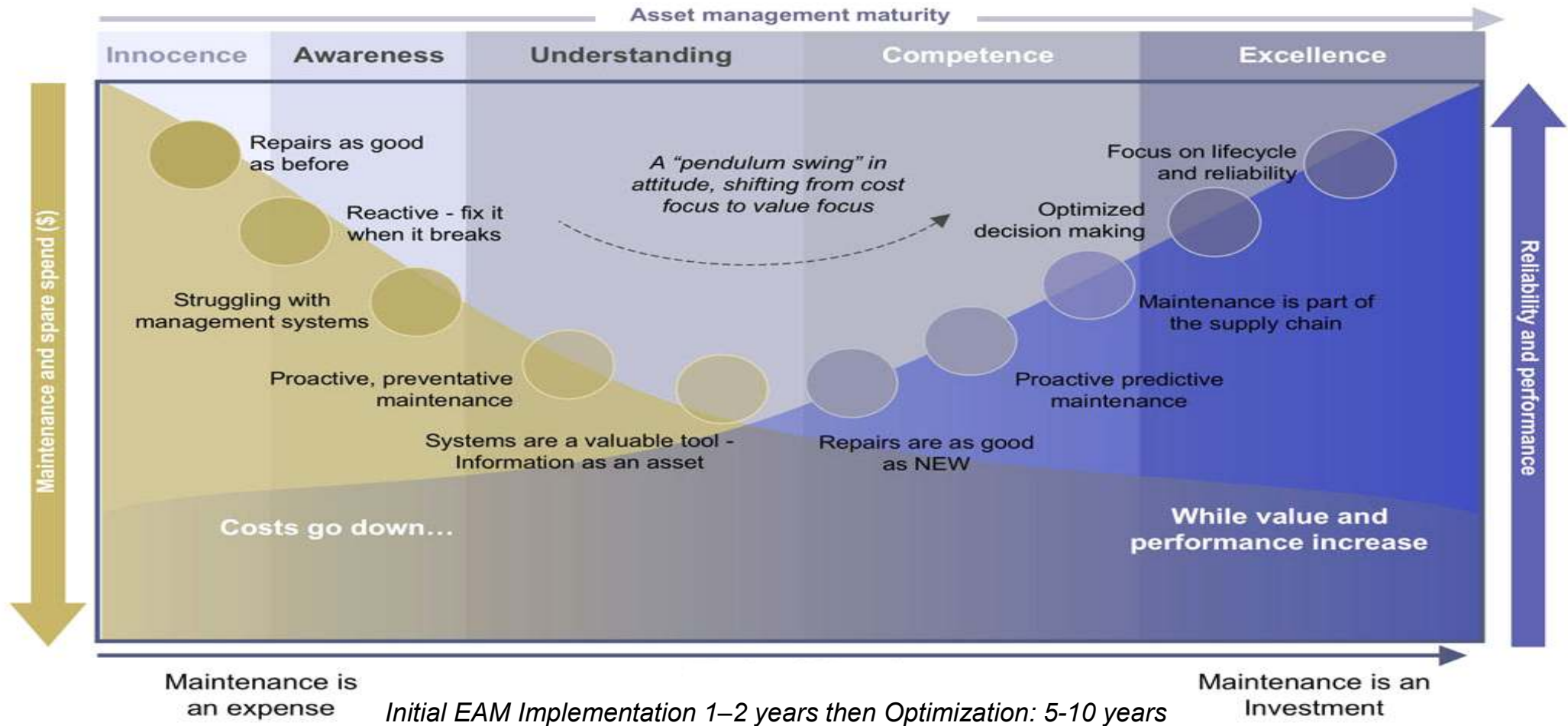
# PAS 55 – Optimized Management of Physical Assets



Source: PAS 55 Part 1: Specifications for the optimized management of physical assets , BSI 2008

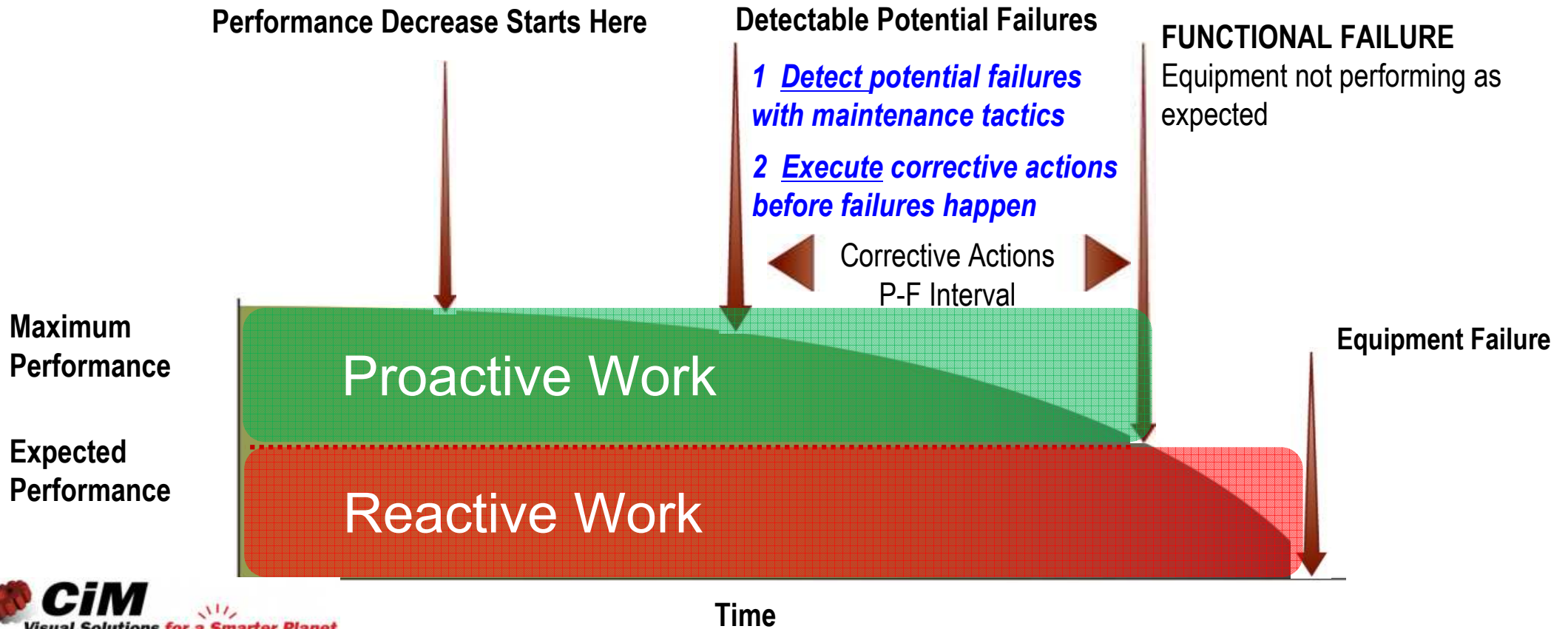


# Asset Management Maturity





# Maintaining the Service of the Assets





# Defining and implementing a Maintenance Strategy

Figure 1: Steps in the RCM process

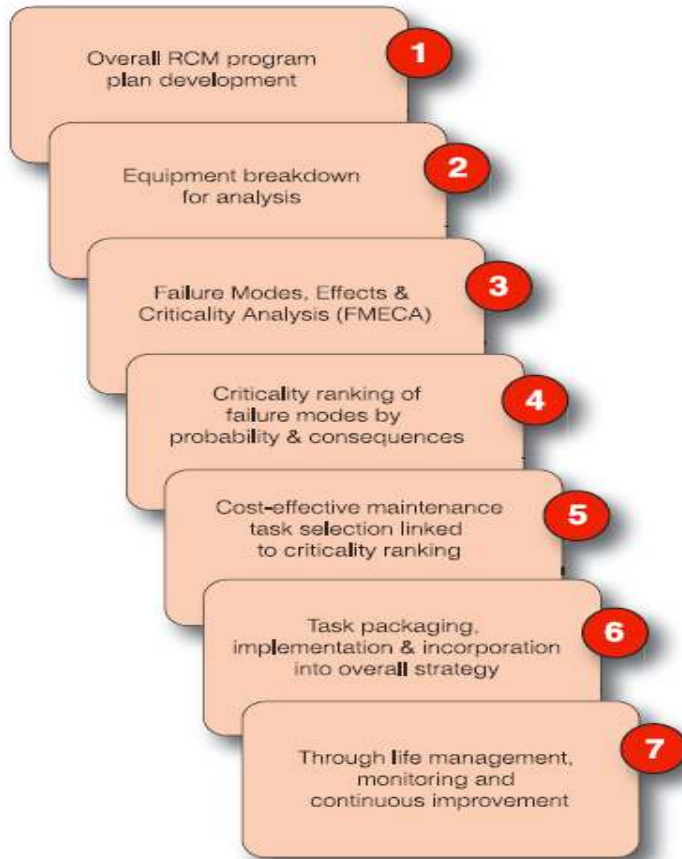


Figure 3: Equipment classification for analysis

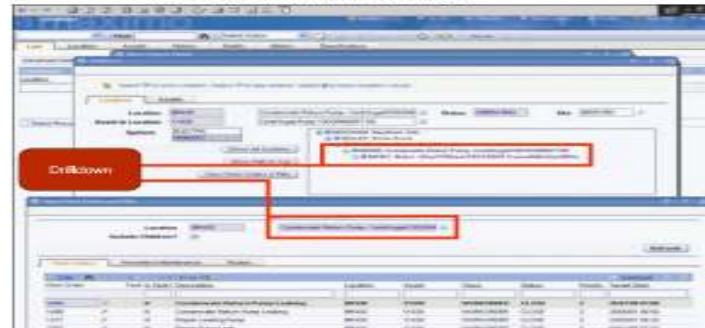


Figure 4: RCM work packaging

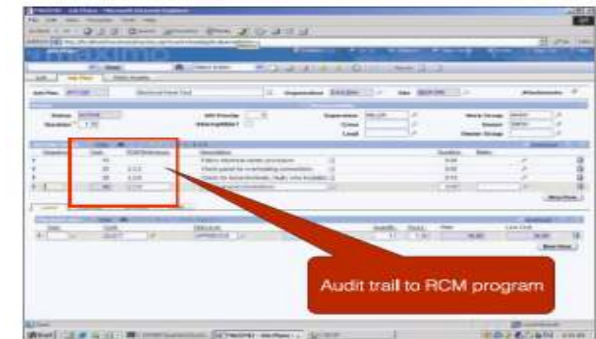
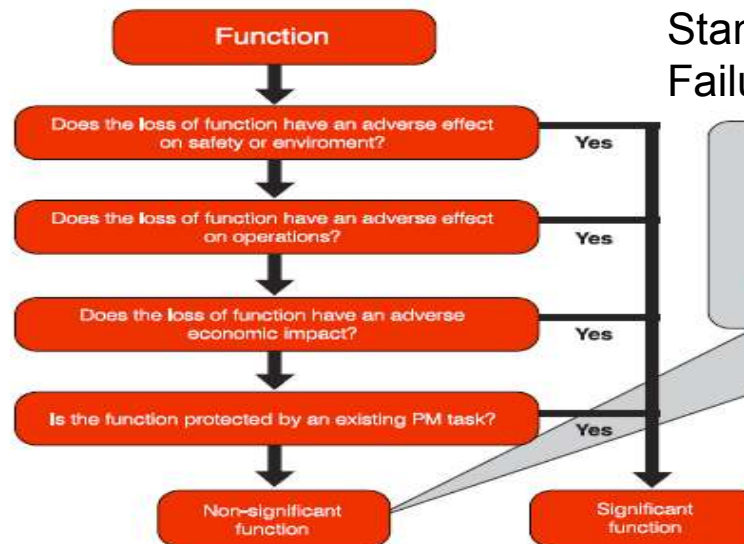


Figure 5: Criticality ranking of failure modes

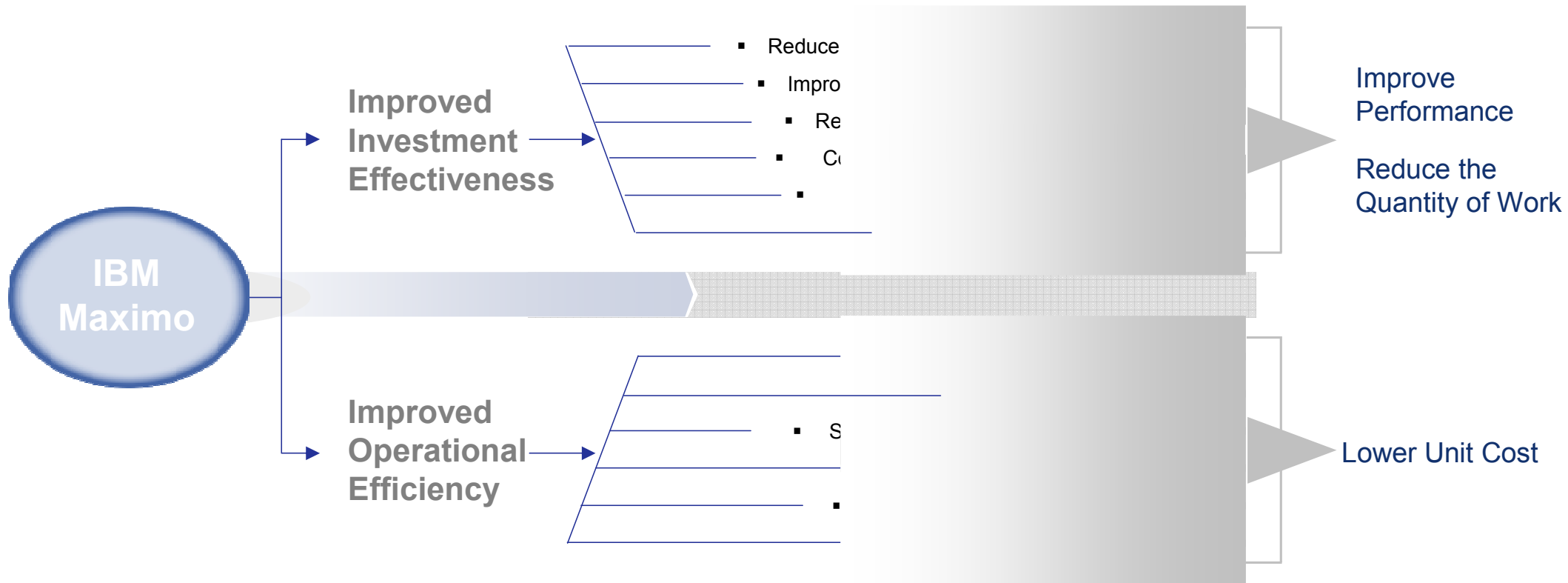


Standards for Failure reporting:  
Failure => Cause => Remedy

Target of this stage is elimination of effective maintenance  
Key risk feature of RCM



# Asset Centric Operating Model Can Deliver Hard Benefits



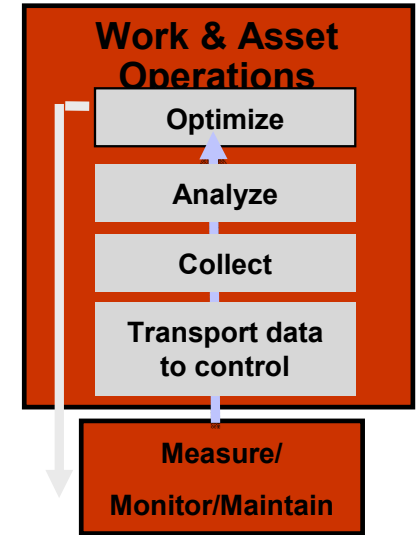
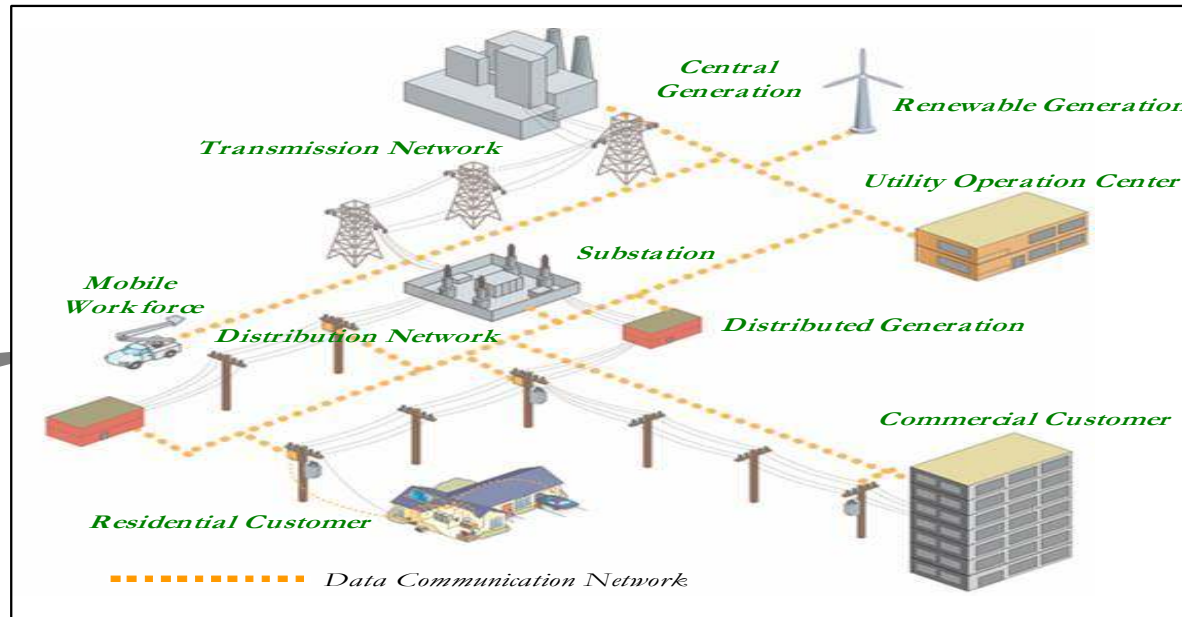
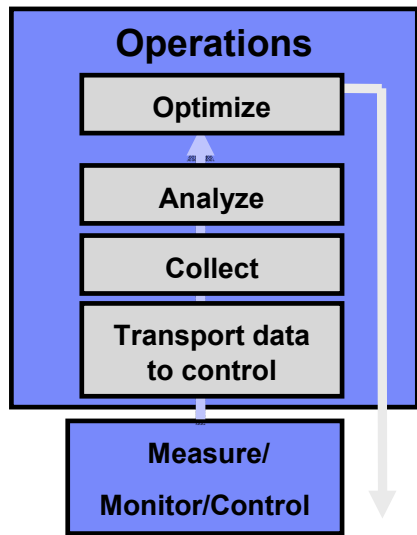
Without sacrificing safety or service levels





# Integrated Operations - IT OT Convergence

## Operations – Human Sensors



The Electric Network – Gas and / or Water



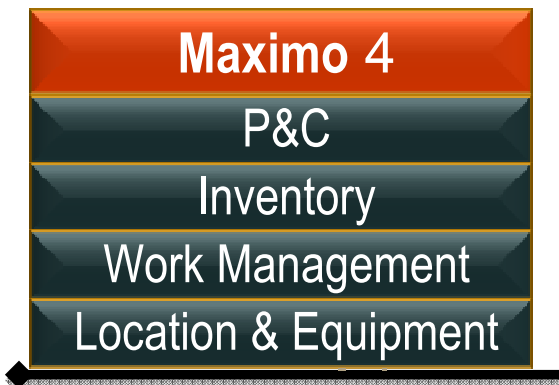
# ADWEA deployment of Maximo and now on to 7.5 and RCM

**Mustafa Aziz,**

**Transforming Non Traditional Business Processes using Maximo**



هيئة مياه وكهرباء أبوظبي  
Abu Dhabi Water & Electricity Authority



**2002**

*Implement Basic Best Practices to meet Core Business Process*



**2005**

*Enhance Processes with further Building Blocks*



**2009-2010**

*Smart Initiatives to meet the Business Growth*

7.5 Upgrade  
Spatial and Esri 10.1  
HSE Scheduler  
Mobile Next  
Asset Criticality  
CBM & RCM  
**2012-2014**



# Asset Management with MAXIMO at SFPUC

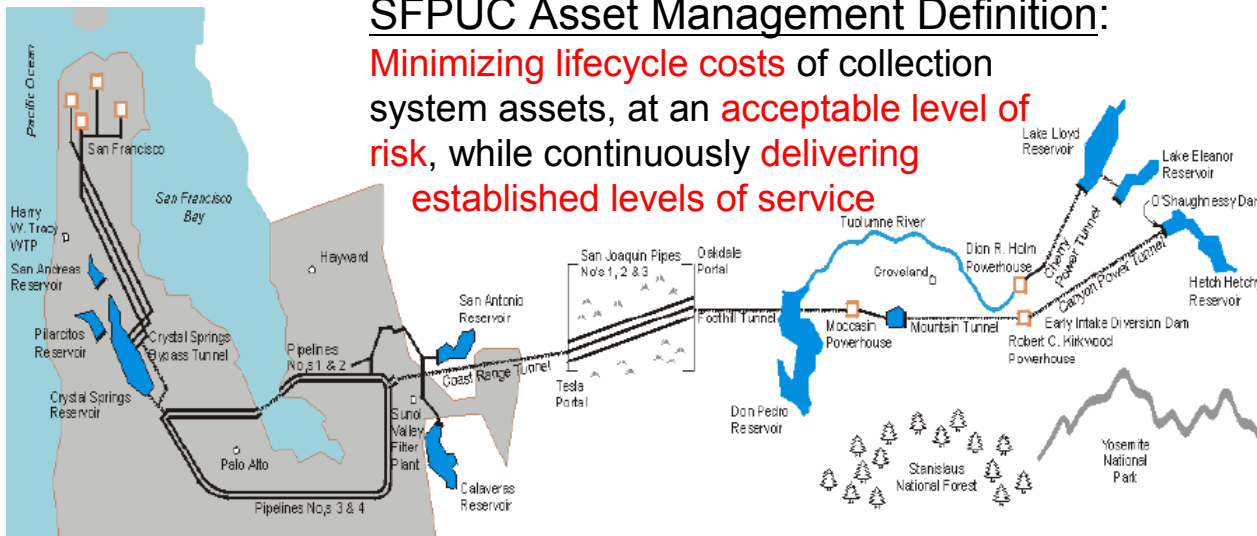
## San Francisco Public Utilities Commission SFPUC Water, Power & Wastewater System

- Longtime user of Maximo since 4.11 moved to 7.1 and next 7.5
- Upgrading Esri GIS to 10.1 and implementing Maximo Spatial – Sept 2013
- Using Spatial Analytics and Asset Data to improve Service
- Detect clustering of service calls in problematic areas (flooding, odor)



### SFPUC Asset Management Definition:

Minimizing lifecycle costs of collection system assets, at an acceptable level of risk, while continuously delivering established levels of service





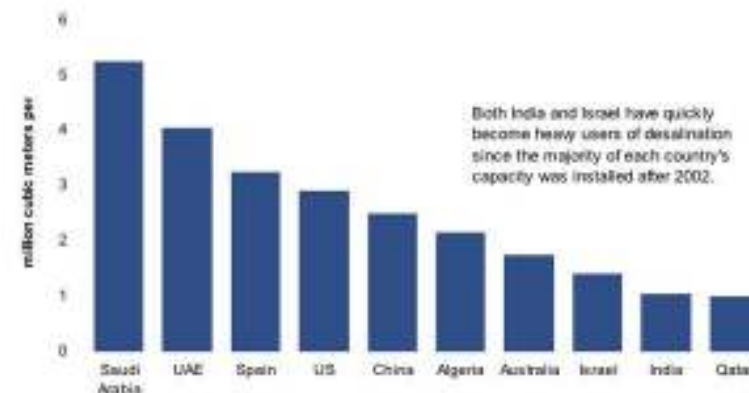
# Water Industry Trends

1. Water Re-Use will become a new Water Supply
2. Desalination systems are growing around the world
3. Highly contaminated water is energizing water treatment
4. Membranes are displacing chemicals in water treatment
5. Forward osmosis is the new form of desalination
6. Ultraviolet light disinfection is replacing chlorine
7. Chinese competition in high-tech sectors like filtration is growing
8. Growth opportunities in water efficiency products
9. Point of use treatment is becoming more popular
10. Distinction between water service and equipment providers has been blurring

\$450 Billion Water Market  
Global Water Consumption is doubling  
Every 20 years

*Dramatic Price Increases*  
*Increased Spending on Infrastructure*  
*Financial Crisis – Lower household incomes*

Figure 4. Top 10 Countries by Installed Desal Capacity Since 2003



Source: Global Water Intelligence Reports

Source: Citi Investment Research and Analysis <http://www.businessinsider.com/10-fascinating-trends-in-water-companies-poised-to-gain2011-5#>

# Move to Renewables: Hydro – Solar – Wind – Geo-Thermal

- 19% of electric generation is from renewables
  - ✓ 16% Hydro and 3% other re-newable
- Solar is the fastest growing more than doubling every 2 years since 2007: ~67,000MW Capacity
- Wind is growing >20% annually: ~238,000MW
- Largest Geo-thermal Field is the Geysers (750MW) – Calpine Corporation – uses Maximo
- Solar Generators may produce most of the worlds electricity within 50 years (International Energy Agency Projection)
- Some countries get most of their power from renewables: Iceland and Paraguay (100%), Norway (98%), Brazil (86%), Austria (62%), New Zealand (65%), and Sweden (54%)



Maximo is being used to manage renewables as they are added to the fleet

In 2010, renewable power consisted about a third of the newly built power generation capacities

Renewables Status Report 2011: [http://www.ren21.net/Portals/97/documents/GSR/GSR2011\\_Master18.pdf](http://www.ren21.net/Portals/97/documents/GSR/GSR2011_Master18.pdf)



## Move to Lower Cost / Cleaner Fuels



- US Price of Natural Gas plummeted > 80% since 2008, ~45% in 2011
- Utilities are switching over from Coal to Natural Gas to lower cost and emissions
- Southern Companies Georgia Power filed to cut rates 6% citing 19% drop in fuel costs (Xcel Energy, AEP, and Dominion investing in Coal to Gas Switching)
- Coal accounts for ~ 47% of generation and this could be reduced to ~ 22% by 2030 due to this trend and renewables cutting power plant emissions by over 40%



Significant Reduction in Asset Management Cost without coal handling equipment



# Kinder Morgan – El Paso Gas: North America's Largest Gas Producer

## Pipeline Group



The El Paso Pipeline Group's 42,000-mile interstate pipeline system is the nation's leading interstate natural gas pipeline franchise as measured not only by mileage, but also by access to key supply regions and major consuming markets



*Standardized on Maximo 7.1  
Planning upgrade to 7.5*

## Our Vision and Values

the place to work  
the neighbor to have  
the company to own





# Intelligent Utility Networks, Smart Grid, and Demand Response

- 37.3M Smart Meters installed in US of a total of ~145M
- 110M installed in Europe by 2015, 240M by 2020
- 350M Installed in Asia Pacific by 2016
- 600-700M in China by 2020
- Evolving from Meter to Cash to a Premise to customer end to end information Network
- The tension between data access and privacy is evident today in the smart electrical grid
- Customer Education for benefits and acceptance is key







# IBM has supported smart meter programs representing:

## North America:

American Electric Power  
 Austin Energy  
 BC Hydro  
 BELCO  
 CenterPoint Energy  
 Con Edison  
 Consumers Energy  
 CPFL Energia  
 Entergy  
 First Energy  
 Florida Power & Light  
 Hydro One  
 Hydro Ottawa  
 IESO (Ontario)  
 London Hydro  
 NV Energy  
 Oncor  
 Ontario Energy Board  
 Pacific Gas & Electric  
 Pacific Northwest National Laboratory  
 Pepco Holdings Inc (PHI)  
 Progress Energy  
 Smart Meter Texas  
 Southern California Edison  
 Toronto Hydro

- 80 million installed or planned electric meters globally, supported by IBM
- In excess of 80 utilities, globally, 8 of the 10 largest Smart Meter Rollouts

## Europe:

A2A - AEM Torino	Enemalta
A2A - ASM Brescia	Enel
Alliander	ESB Networks
EDF (France)	Göteborg Energi
EDF Energy (UK)	MVV Energie AG
EDP	Nuon
EnBW	Oxxio
Endesa	RWE npower
	Scottish & Southern Energy
	30 Italian distributors

## Australia:

Country Energy  
 AusGrid  
 Western Power



# MAXIMO Supports Smart Meter Deployment, Work & Asset Management

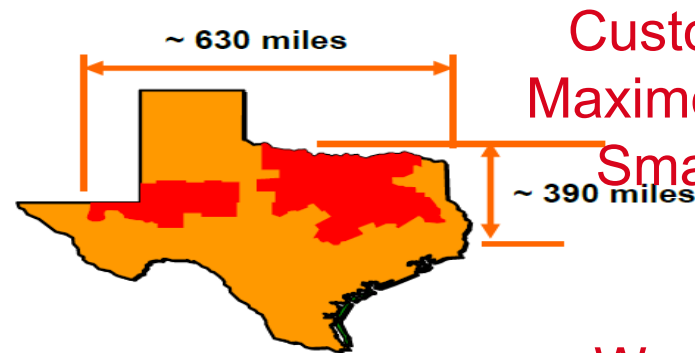
## Advance Metering System (AMS) Profile



- 27,000 square miles of territory
- 3.1 million meters
- 87 customers (Retail Electric Providers – REPs)



- AMS Deployment 2008 - 2012
- 3.4 million AMS meters



Customer using  
Maximo to manage  
Smart Meters

Work & Asset  
Management

Oncor Electric Delivery



## Maximo for Utilities is Smart Grid Ready

- New features added to support smart meters as a new asset class.
  - Improve receiving rotating assets in bulk
  - Improve issues and transfers by pallet number or Box
  - Store meter test results
  - Define meter sampling templates
  - Define meter sampling groups
  - Create random sampling work orders
  - Automate administrative functions that support dispatching of work orders



Live on Maximo for Utilities 7.5  
for Revenue Meter Asset And Work Management

<http://www.trustpower.co.nz/>

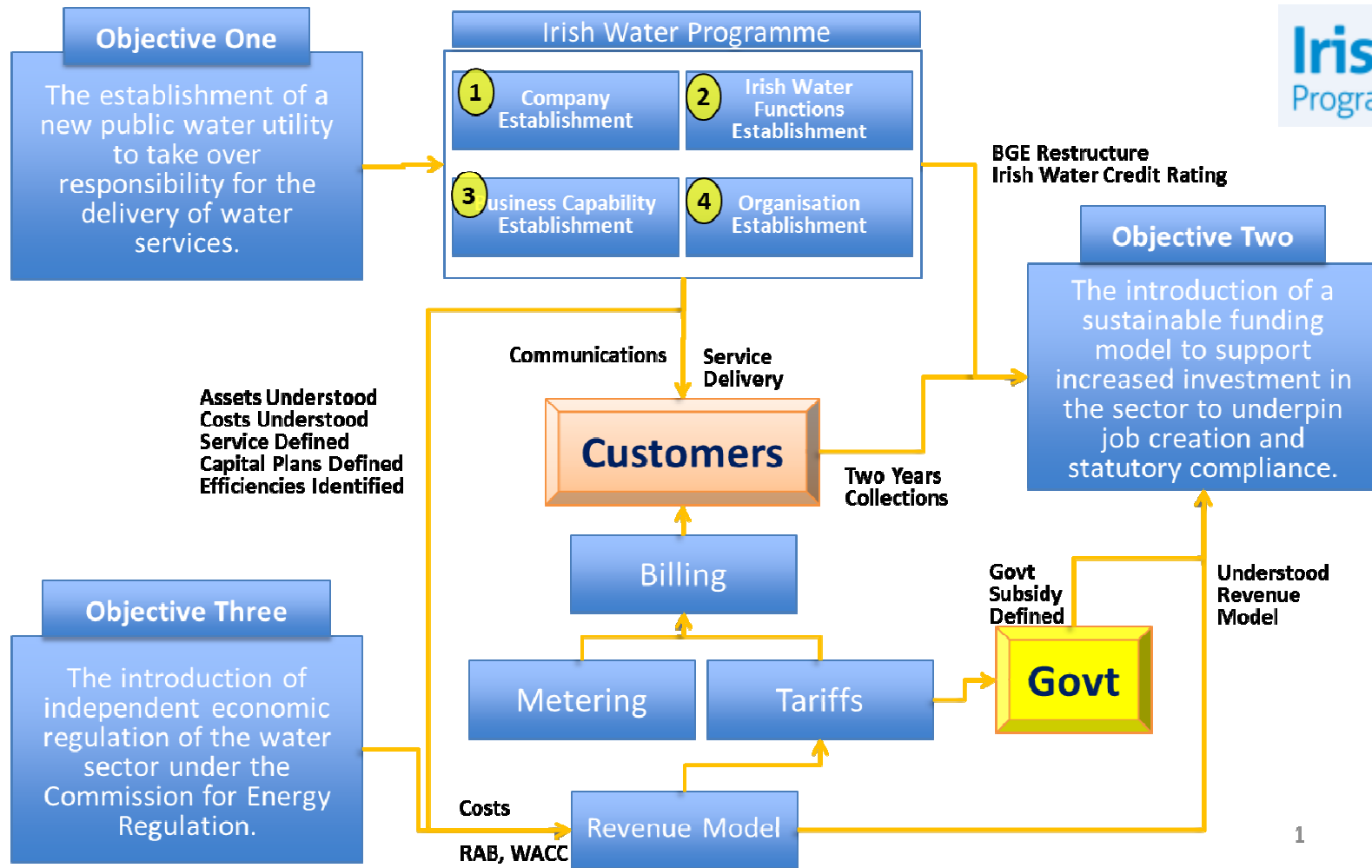
Our TrustPower employees are located across New Zealand but the majority of our employees are based in the beautiful Bay of Plenty at our Head Office in Mount Maunganui, Tauranga, NZ

# Ireland's Gas Network – Standardized on Maximo



- Bord Gáis Networks has developed a world-class gas infrastructure in Ireland comprising:
  - An Interconnector System linking Ireland to the UK & European gas markets
  - 2,373 km Transmission pipeline network
  - 11,030 km Distribution pipeline network
- There are more than 647,000 gas users in Ireland in over 157 population centres within 19 counties throughout the country

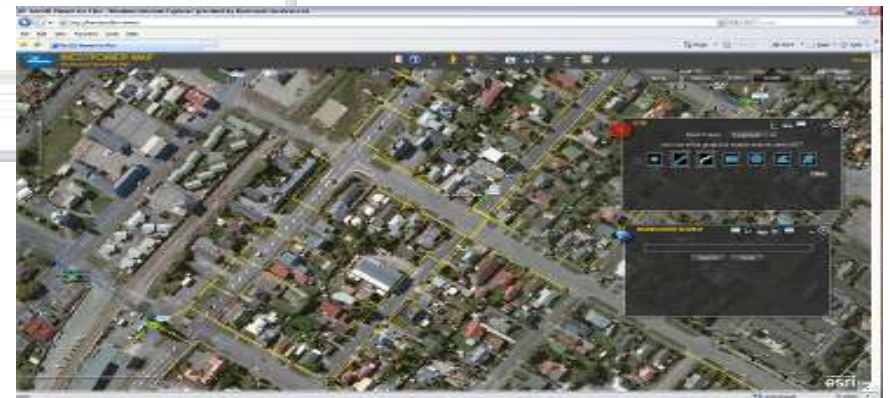
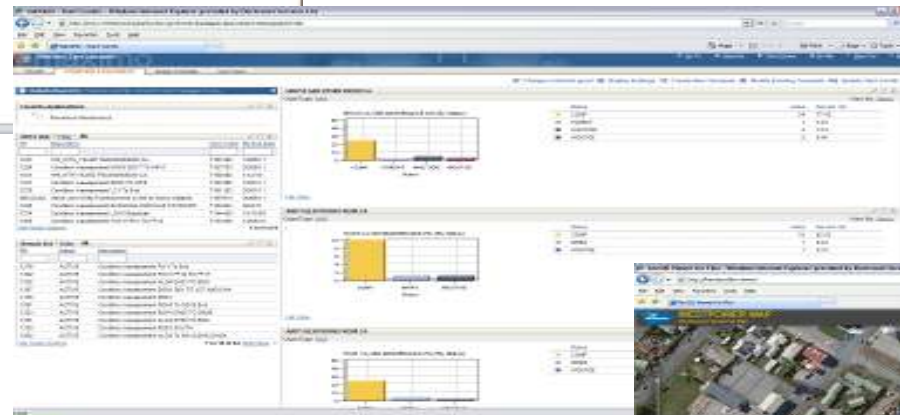
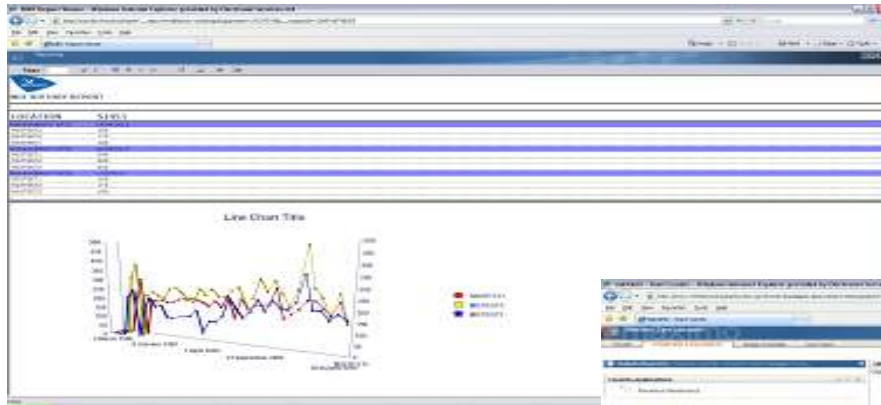
# Irish Water was formed and is standardizing on Maximo





# Westpower / Electronet NZ

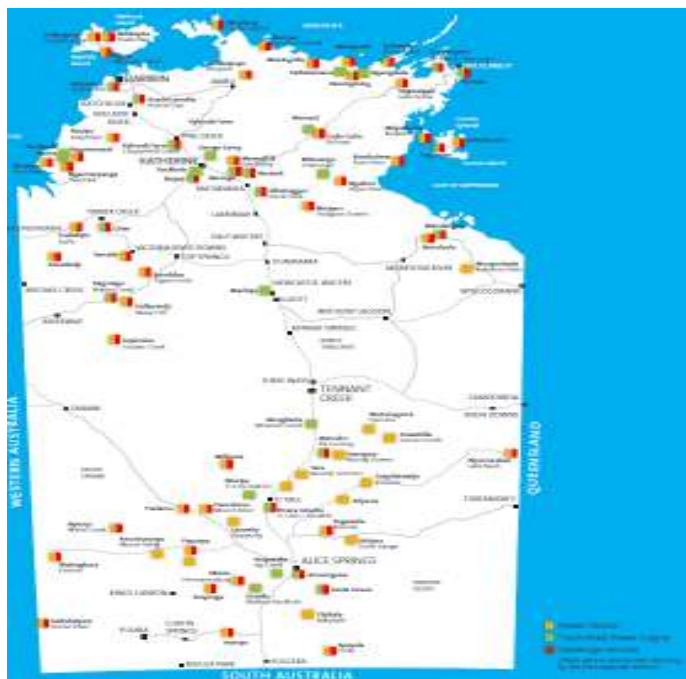
Live on Maximo for Utilities 7.5  
With Spatial Asset Management





# NT Power Water Corporation

Power and Water Corporation provides electricity, water supply and sewerage services to 85,000 customers across the Northern Territory, an area of more than 1.3 million square kilometers



Services are provided across varying environments, from the tropics of the north to the deserts of Central Australia.

With total assets of more than \$1 billion, Power and Water is one of the largest businesses in the Northern Territory, employing more than 1000 Territorians.



Live on Maximo 7 for Utilities with Spatial Asset Management

**PowerWater**



# Application Extensions for PWC

Support for Fault and Outage Management  
SOA based solution provided by ESRI  
Results and display are configurable



## Water Valve Isolation Trace

Finds all the valves that must be operated in order to isolate an area. Also displays pipes and service points affected



## Protective Devices Upstream Trace

Finds all protective devices upstream of the start point, by phase



## Power Downstream Trace

Finds all features in a feeder system by phase that are downstream of the starting point



## Sewer Isolation Trace

Traces an underlying geometric network from a starting point to the source

Added spatial context to PM application



# URUGUAYAN ELECTRICITY OPERATIONS



Fernando Puig, UTE Uruguay

6,500 EMPLOYEES



- STATE-OWNED COMPANY
- GENERATION, TRANSMISSION AND DISTRIBUTION OF ELECTRICAL ENERGY
- ESTABLISHED IN 1912
- SERVES WHOLE URUGUAYAN TERRITORY: 68,000 mi<sup>2</sup> AREA AND A 3,300,000 POPULATION 1.3M Customers

+47,000 mi DISTRIBUTION NETWORKS

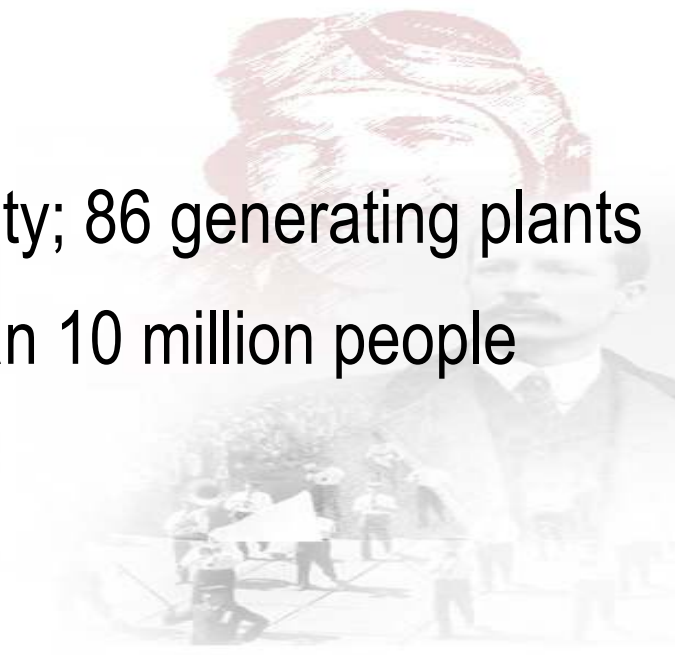
290 HV/MV SUBSTATIONS  
43,900 MV/LV SUBSTATIONS

+4,000,000 ASSETS  
TO MAINTAIN



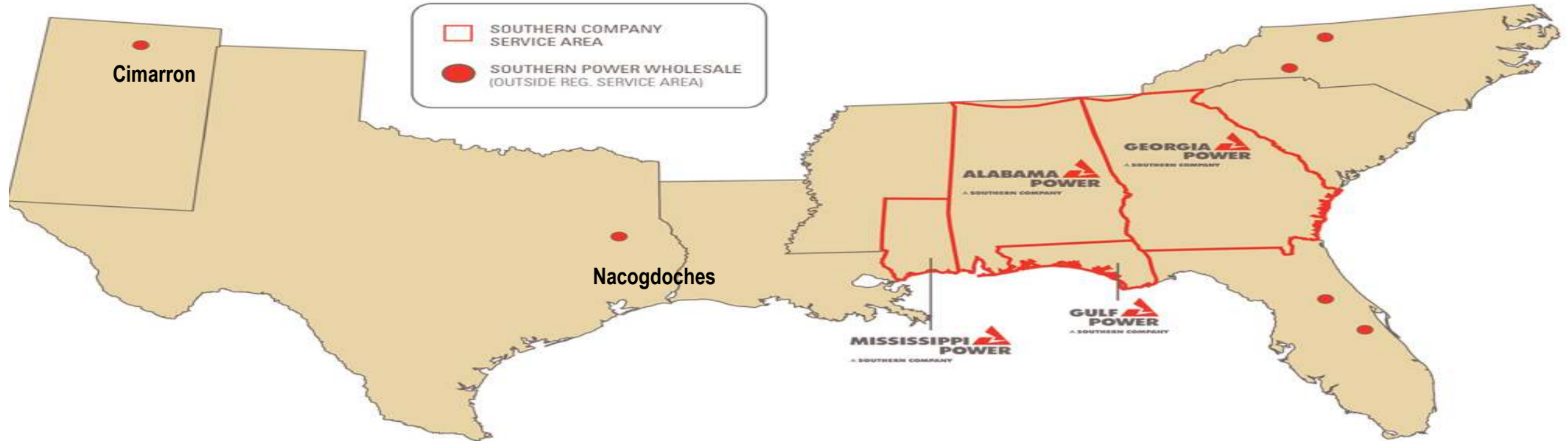
# Southern Company Vital Stats

- 2011 Operating revenues: \$17.7 billion
- 2011 Net income: \$2.2 billion
- 2011 Total assets: \$59 billion
- Over 43,000 MW of electric generating capacity; 86 generating plants
- 4.4 million retail meters representing more than 10 million people





# Who is Southern Company



**~ 14,000 Maximo Users, 96 sites, 689 storerooms, 901,082 Locations, 728,396 Assets**

**SOUTHERN COMPANY**  
Alabama Power | Georgia Power | Gulf Power | Mississippi Power  
Southern Nuclear | Southern Power | SouthernLINC Wireless

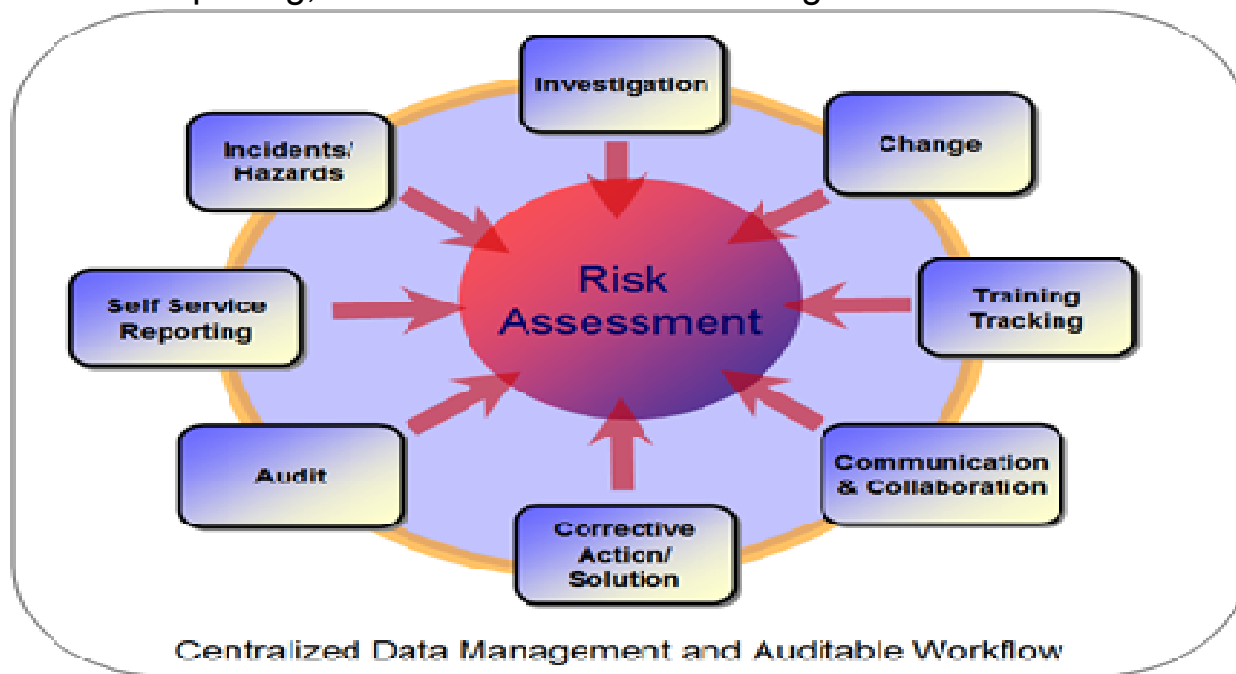


# Southern Power: 13 Power Plants 8,500 MW of Generation: 5 Combined Cycle; 4 Gas Turbine Peaking Plants; 1 Biomass and 3 Solar On Maximo 7.5 and Implementing HSE Manager

## Highlights

- Best Practices for improving safety, reliability, and compliance
- Facilitates meeting regulations and legislated requirements for health, safety and the environment.
- Standardization is the basis for measuring, and continuously improving performance
- Collaboration across operations, engineering, maintenance and management
- Enterprise scale for improving compliance activities in a risk-based, safety and quality oriented environment

- Reduce overall risk, to comply with regulations, and to create a safe yet efficient operating environment for a company.
- Maximo Health, Safety, and Environment provides applications for audit management, risk assessment, safety reporting, management of change, condition reporting, corrective actions and training.





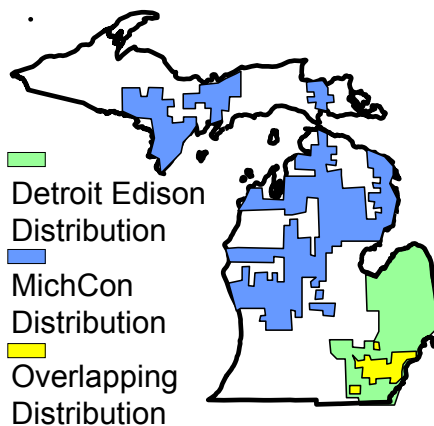
# DTE Energy: 11,000 + Maximo Users

## Strong, Stable and Growing Utilities

### Detroit Edison



- Electric generation and distribution
- 2.2 million customers
- Fully regulated by Michigan Public Service Commission (MPSC)
- 55% of DTE Energy's net income
- Ninth largest electric utility in the U.S.
- 2.2 million customers
- Over 11,000 MW of power generation, Fermi 2 Nuclear 1200 MWe



### MichCon



- Natural gas distribution
- 1.3 million customers
- 15% of DTE Energy's net income
- Fifth largest natural gas utility in the U.S.
- 200 Bcf of gas sales
- 12% of national gas storage capacity
- 124 Bcf of regulated



## DTE Energy

## Complementary Non-Utility Growth Businesses

### Coal & Gas Midstream



### Unconventional Gas Production



### Power & Industrial Projects



### Energy Trading

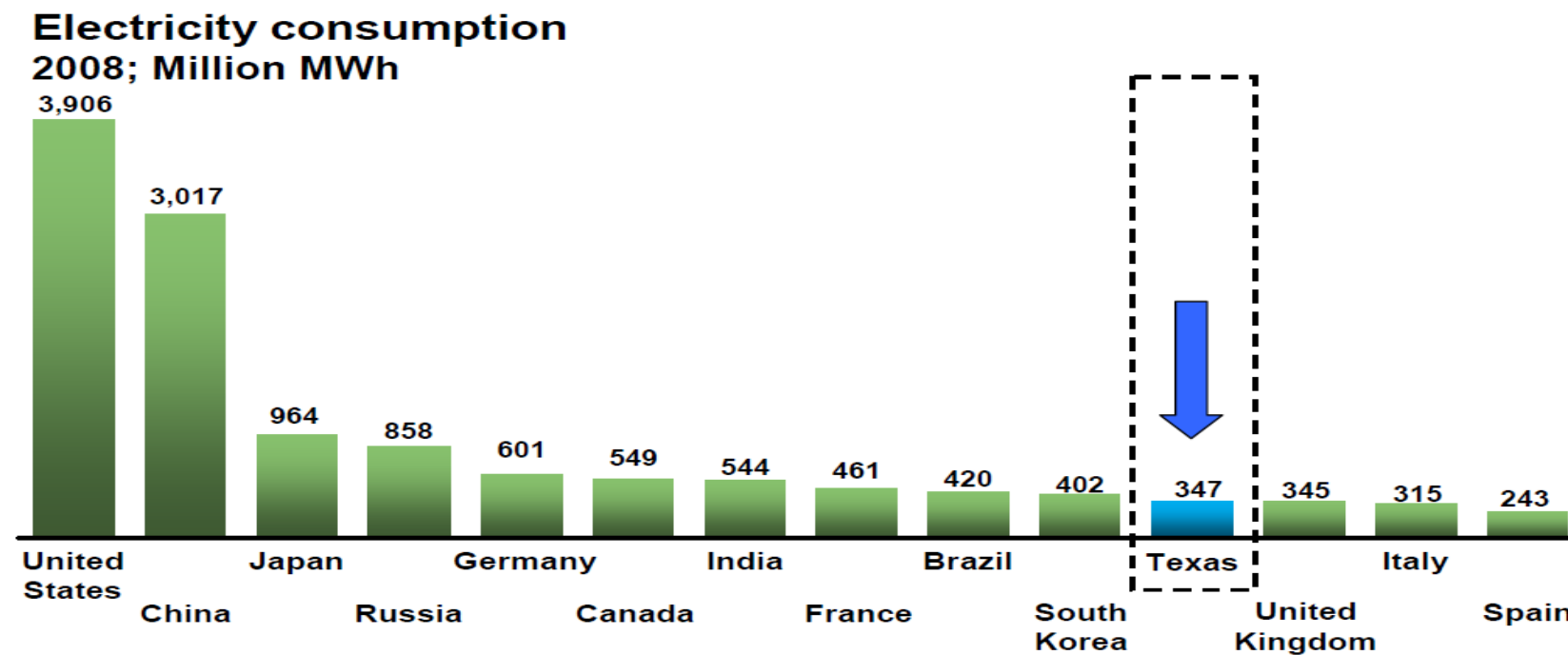


### Synthetic Fuel





## Texas is the 11<sup>th</sup> Largest Power Market in the World



*China's power market is growing rapidly and now exceeds the size of the U.S. power market. Texas is the largest U.S. power market*

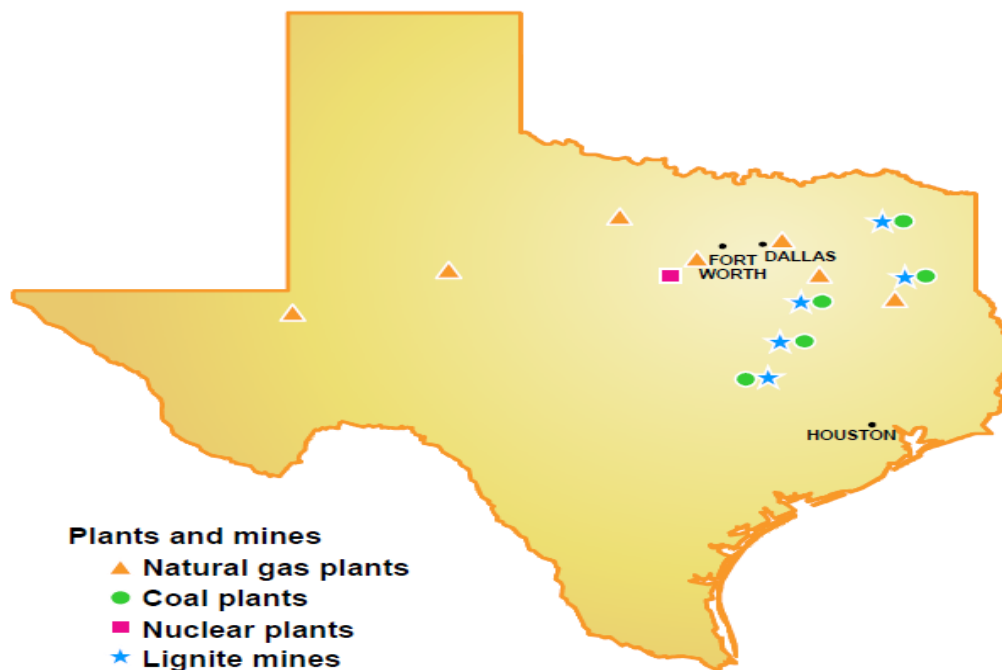
Source: EIA:  
Energy Information Administration



## Business Profile

### Luminant Profile

- 15,400 MW of capacity
- Largest generator in Texas
- 11th largest US coal miner
- 4,400 employees
  - 2,250 plant employees
  - 1,750 mine employees
- **Growing business:** added 3 new plants, 2 new mines, and 675 employees since 2007



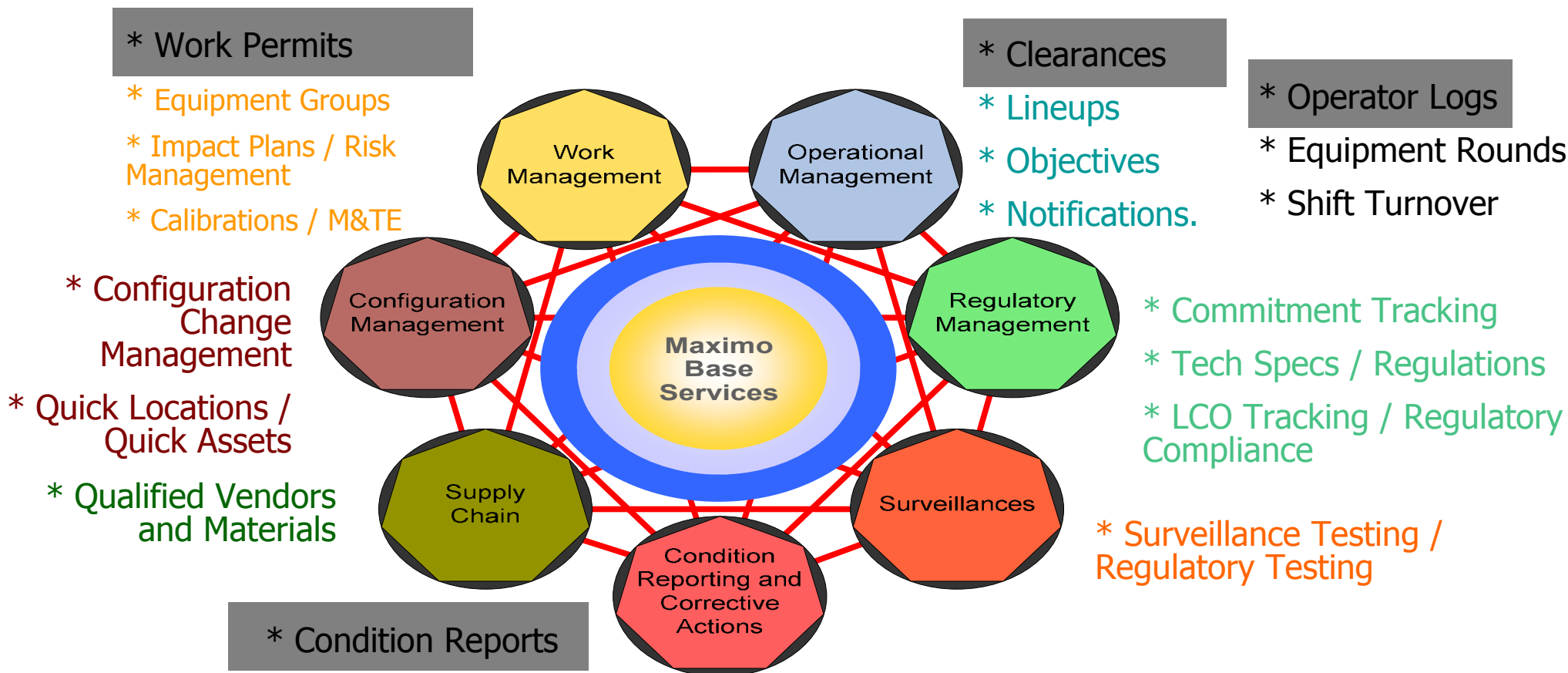
*Luminant is the largest generator in Texas and a wholly owned subsidiary of Energy Future Holdings, a portfolio company of KKR/TPG/Goldman Sachs*



# Luminant Nuclear Solution Across the fleet



## Maximo Operational Management Highlights Nuclear Solution for the entire Generation Fleet







# Tennessee Valley Authority



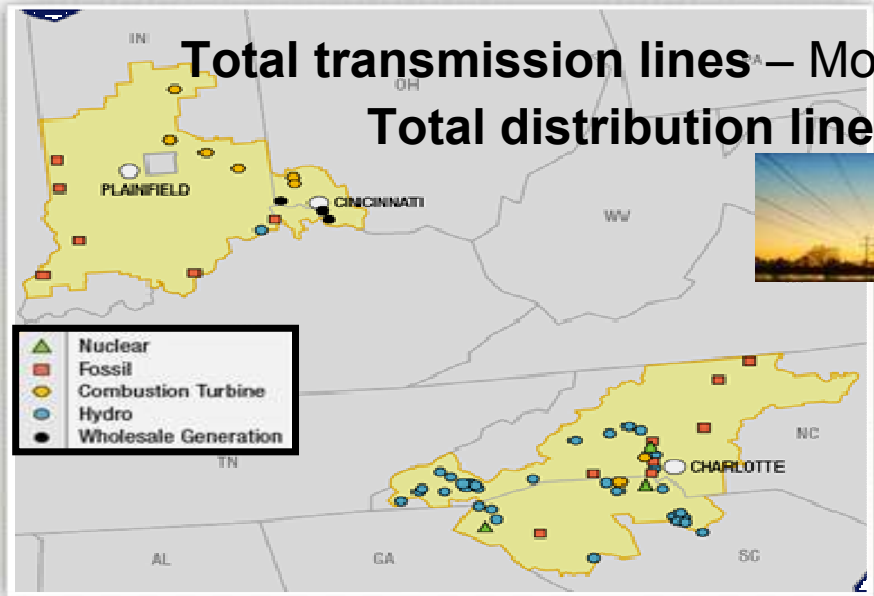
- TVA is the United States largest public power company, providing wholesale power to
  - 155 local power distributors
  - 50 industrial customers
  - 6 federal installations
  - Approx. 9 million people in seven states
- TVA has a diverse generation mix, including:
  - 11 fossil plants (59)
  - 3 nuclear plants (6 Units)
  - 29 hydro-electric dams (109 Units)
  - 9 Combustion turbine sites (87 Units)
  - 3 Combined Cycle sites (7 Units)
  - 1 pumped storage facility (4 Units)
  - 16 solar generation sites
  - 1 wind energy site
  - 1 digester-gas site
  - 1 biomass-cofiring site
- Revenues from power sales are more than \$10 billion annually – TVA receives no public tax dollars





# Duke Energy - U.S. Franchised Electric

**Duke Energy** is a Investor Owned Electric and Gas utility based in Charlotte, NC serving 5 states; North and South Carolina, Indiana, Ohio and Kentucky. We have 47,000 sq. mi. of service area, 28,000 MW of regulated generation, assets of \$48 billion.



## Utility Customers:

**Total Electric** – 3.9 million\*

**Total Gas** – more than 500,000\*\*

**Duke Energy Carolinas** – 2.3 million

**Duke Energy Ohio** – 687,000

**Duke Energy Kentucky** – 134,000

**Duke Energy Indiana** – 774,000



# MAVIR Hungarian Transmission Operator Co.



## MAVIR gets full visibility of maintenance costs

*Smarter asset management with IBM Maximo and SAP*

### The Benefits

- To complete the migration to IBM Maximo, MAVIR chose to implement a range of IBM infrastructure and eliminate legacy and other systems, **saving costs and reducing complexity.**
- **Consolidating multiple software platforms to gain 360-degree awareness of business costs, procurement, and maintenance.**
- *Enormously improved MAVIR's business planning processes.*
- *Provided bottom-up planning data.*
- *Linked enterprise-level economic, management and operational decision making into one solution.*

*"Using IBM Maximo supports and optimizes maintenance of our assets more efficiently. With the help of IBM Maximo, we can create, review, optimize and execute maintenance strategy from a single location, and then send the necessary financial and operational data as confirmed, validated data to the SAP solutions."*  
— Project Manager, MAVIR

### Solution Brief –

Software: IBM Maximo® Asset Management 6.2.4  
Applications: SAP Apps.  
Servers

- IBM® Power Systems™
- IBM System Storage®
- IBM BladeCenter®

Services IBM Global Technology Services  
IBM Business Partners

- T-Online Hungary
- MVM Informatika





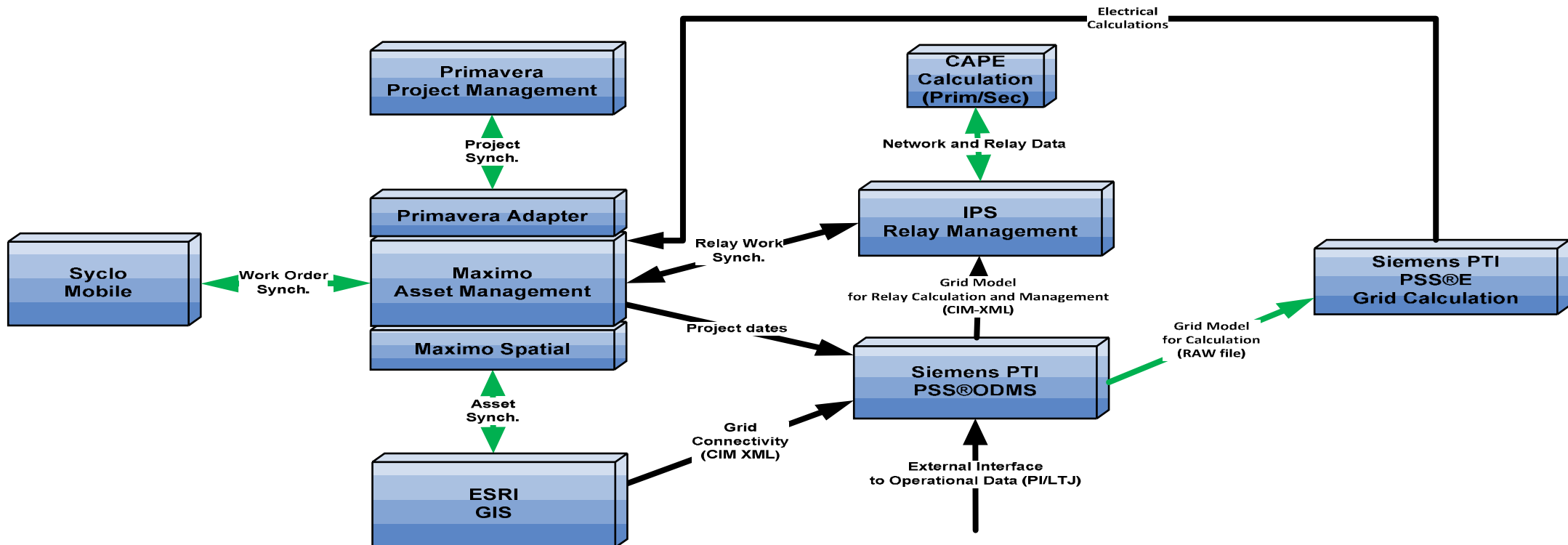
- Fingrid Oyj is responsible for planning and monitoring the operation of the Finnish electricity transmission grid and for maintaining and developing the grid.
  - A very lean organization, highly specialized and outsourced.
  - Perceives themselves as a best in class TSO globally.
  - Mainly young and dynamic team in key project positions





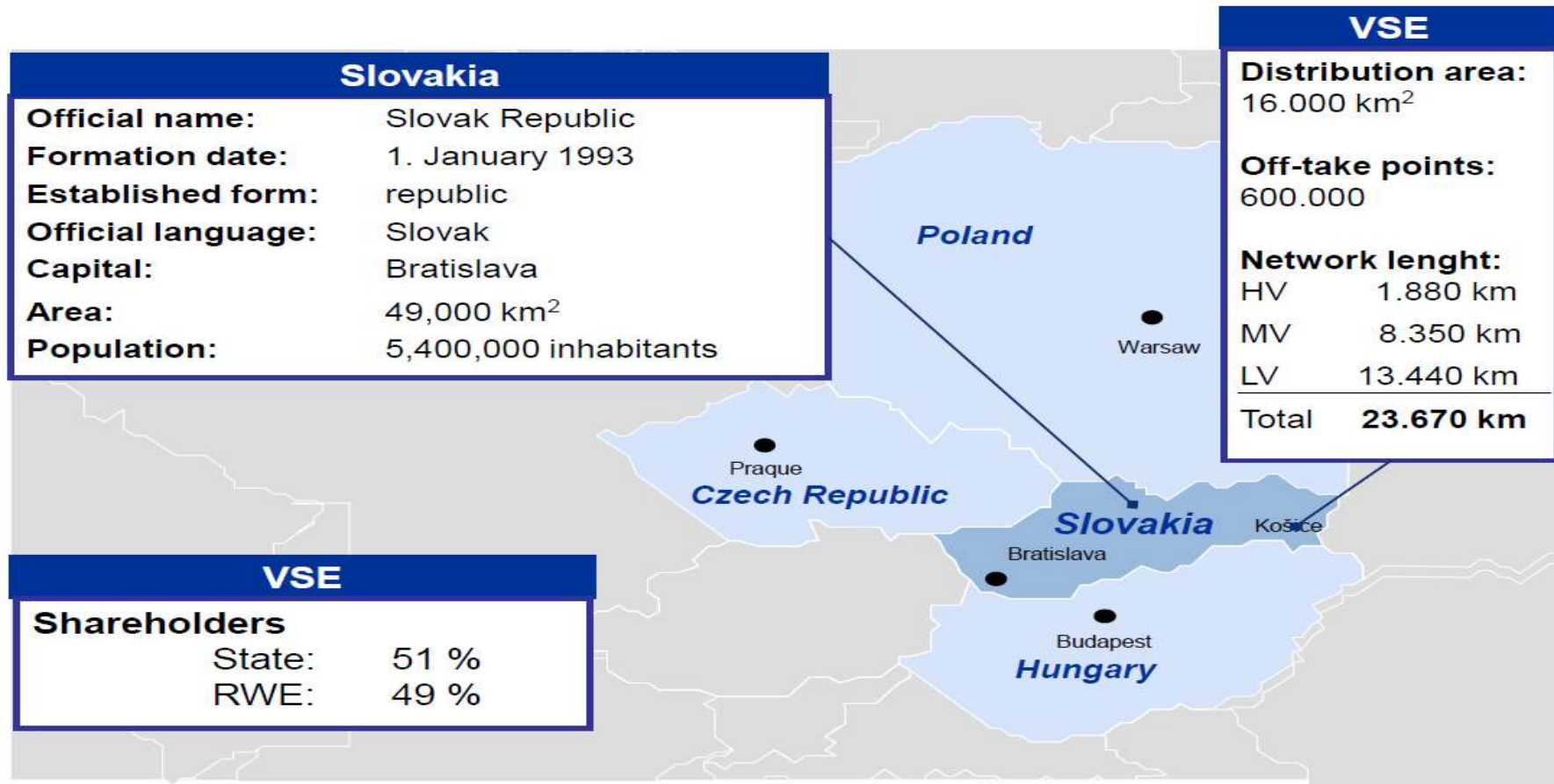
## ELVIS high level architecture

Use of standard integration and alignment with CIM standards will ensure seamless integration between key components and will ensure that data integrity is enforced across the solution





# VSE Journey to Workforce Management with Maximo

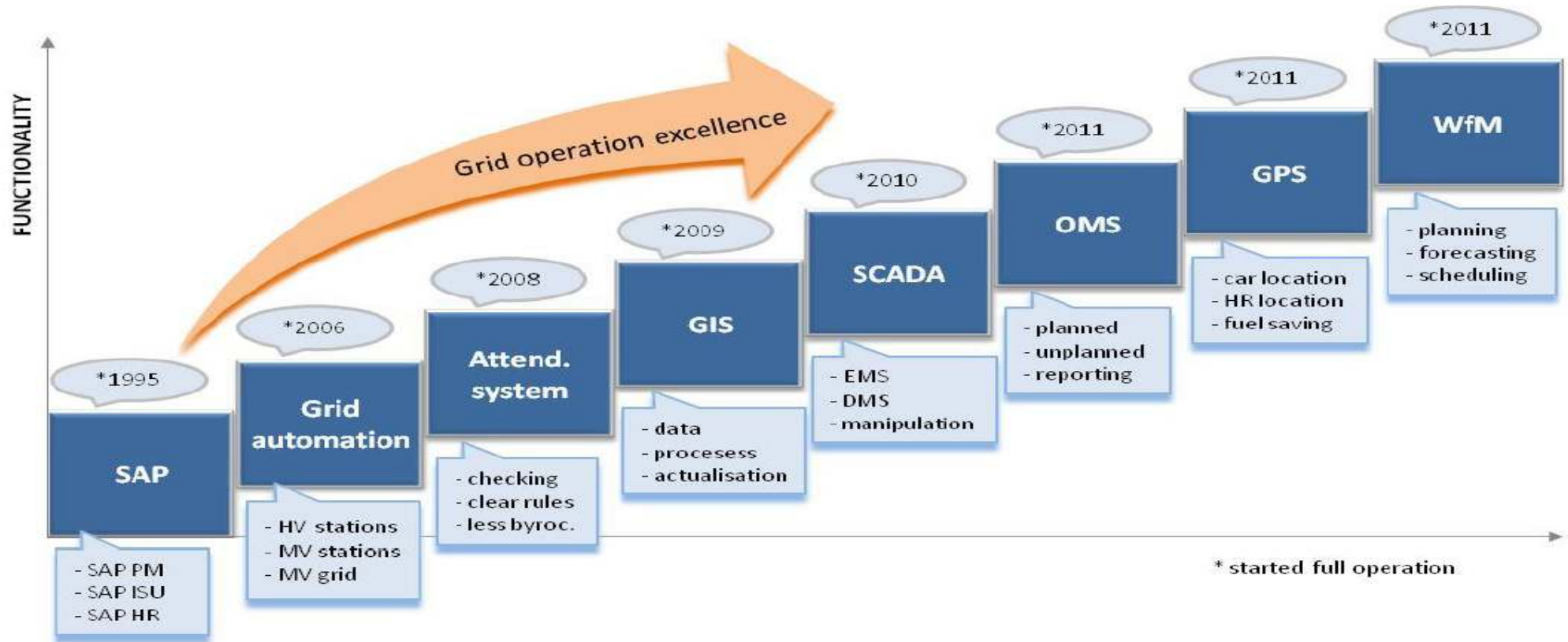


RWEGROUP



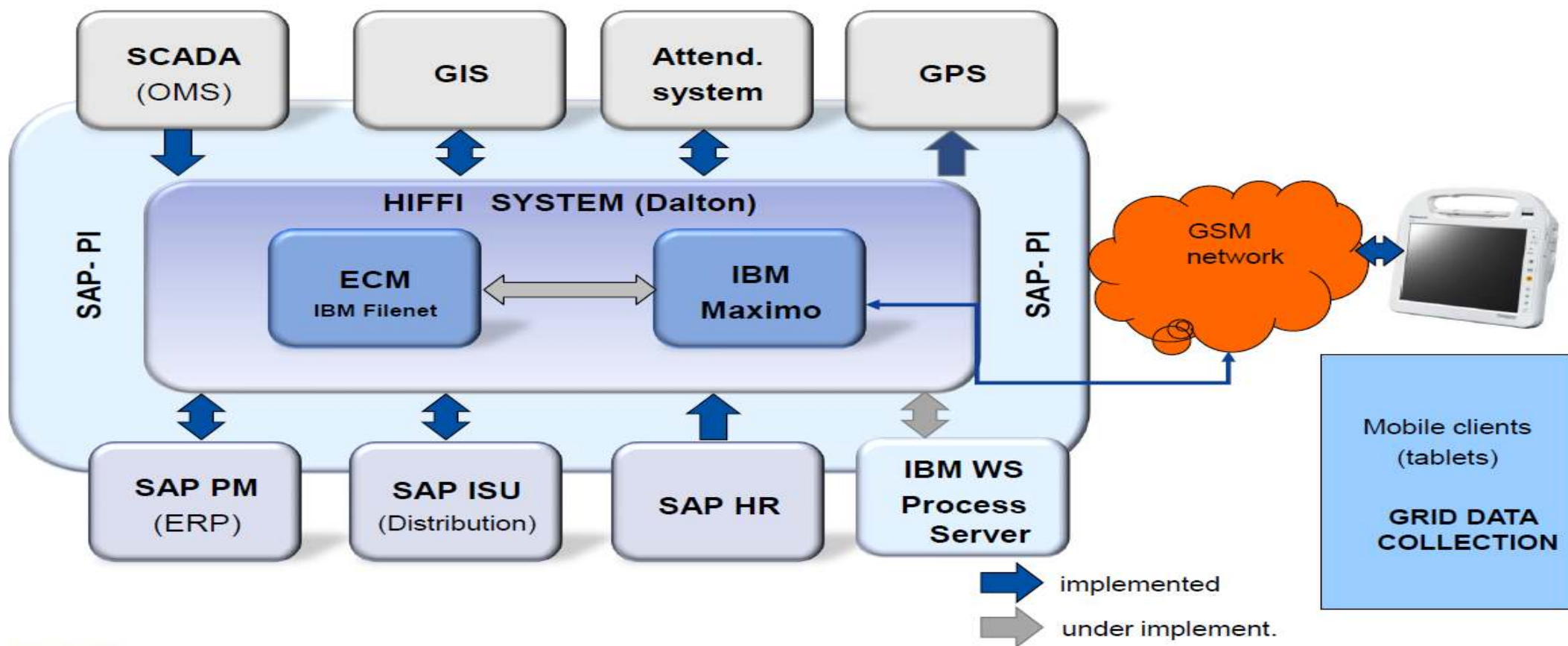


# VSE Journey to Workforce Management with Maximo





# VSE Journey to Workforce Management with Maximo

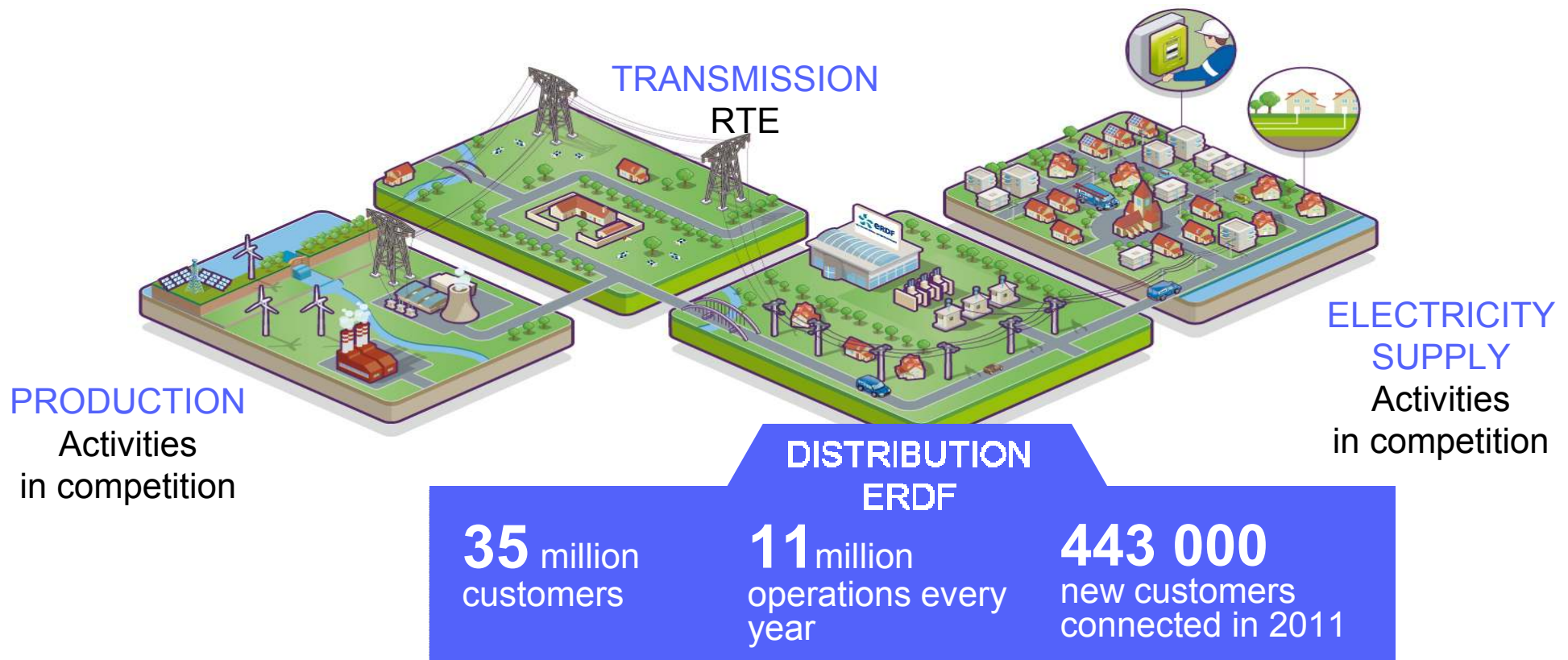






# ERDF's Use of Maximo

*to Manage the French public electricity distribution grid assets*





# Maximo EAM in Renewables

**ACCIONA Energy is standardized on Maximo**



Three lines of business **with the common link of sustainability**

**31,000 employees**

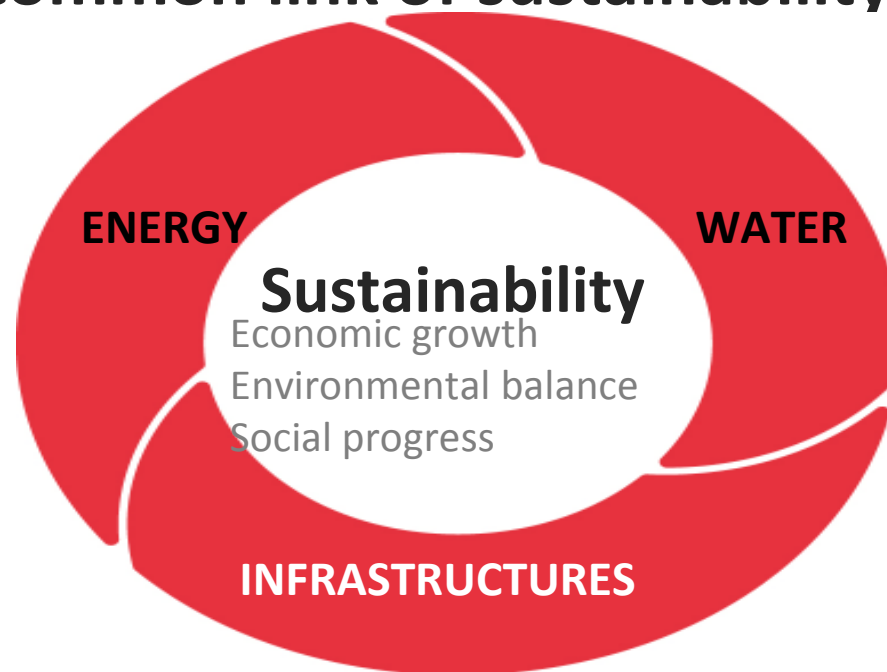
In 30 countries on the **5 continents**

**€ 6,646 MM turnover**

And investments of **989 MM€** in 2011

**€ 1,312 EBITDA**

73% generated by the **Energy Division**





# Maximo EAM in Renewables

## ACCIONA ENERGY

Major presence in **five technologies**



Wind



Concentrating solar



Photovoltaic solar



Hydropower



Biomass

Total (MW)

Company owned

7,096

314

49

912

57

8,428

Customers

1,472

1

67

1,540

Total

8,568

315

116

912

57

9,968



# Maximo EAM in Renewables

## INTERFACES





# Maximo EAM in Renewables

## WIND ENERGY

### Wind

**7,096 MW installed**

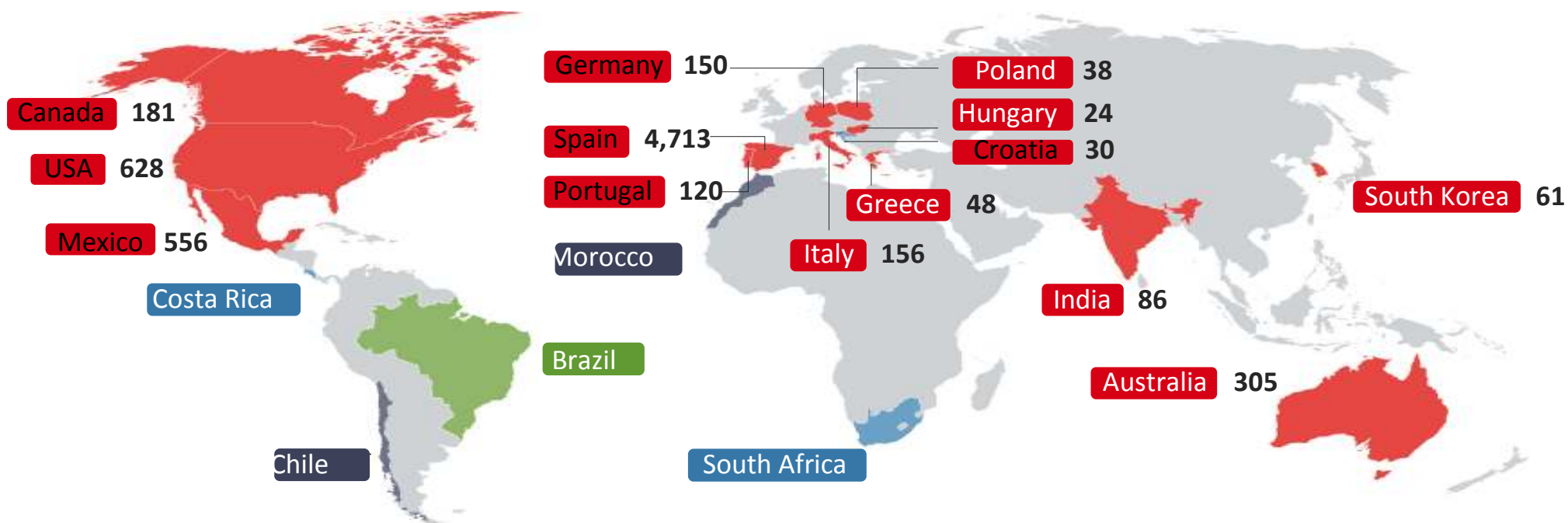
- owned in 15 countries
- **229 operational wind farms** with 6,141 wind turbines
- **Over 17 TWh of production** annual average
- **9,400 million euros** accumulated investment





# Maximo EAM in Renewables

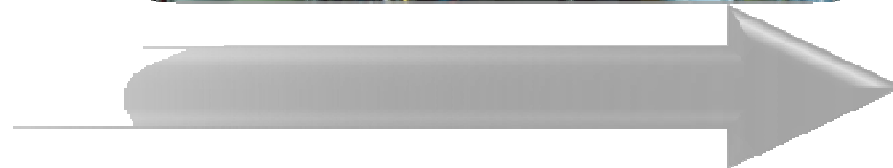
## WIND ENERGY



● Plants in service   ● Projects under construction or awarded   ● Projects at an advanced stage of development   ● Industrial plants

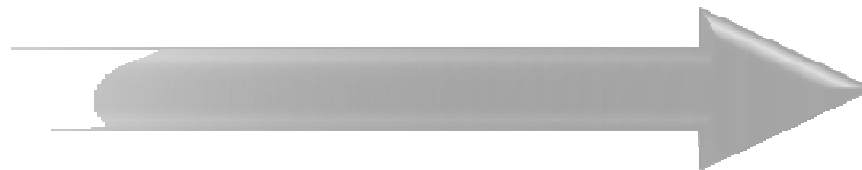
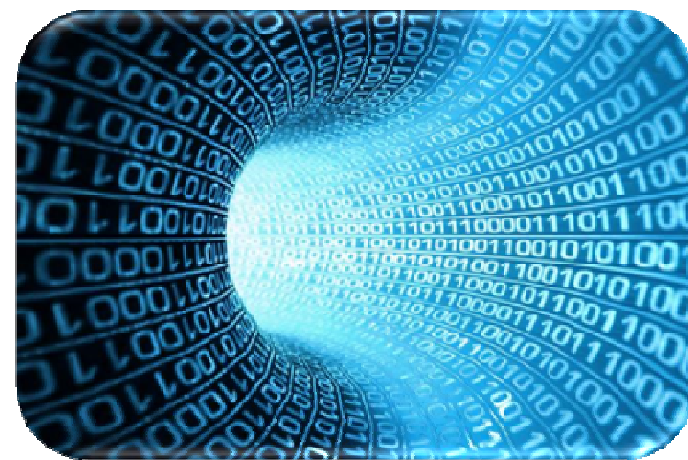
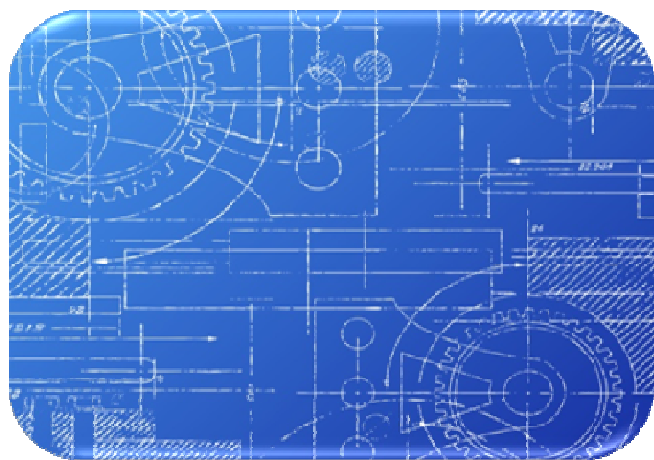


# Infrastructure Is Increasingly Complex





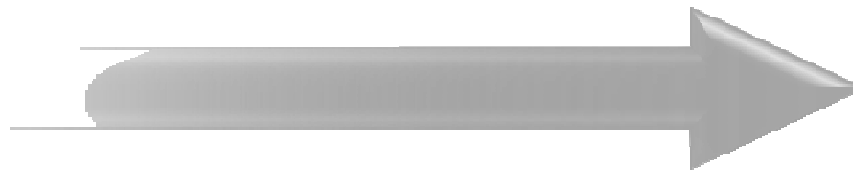
# Variety, Volume and Velocity Of Data is Increasing

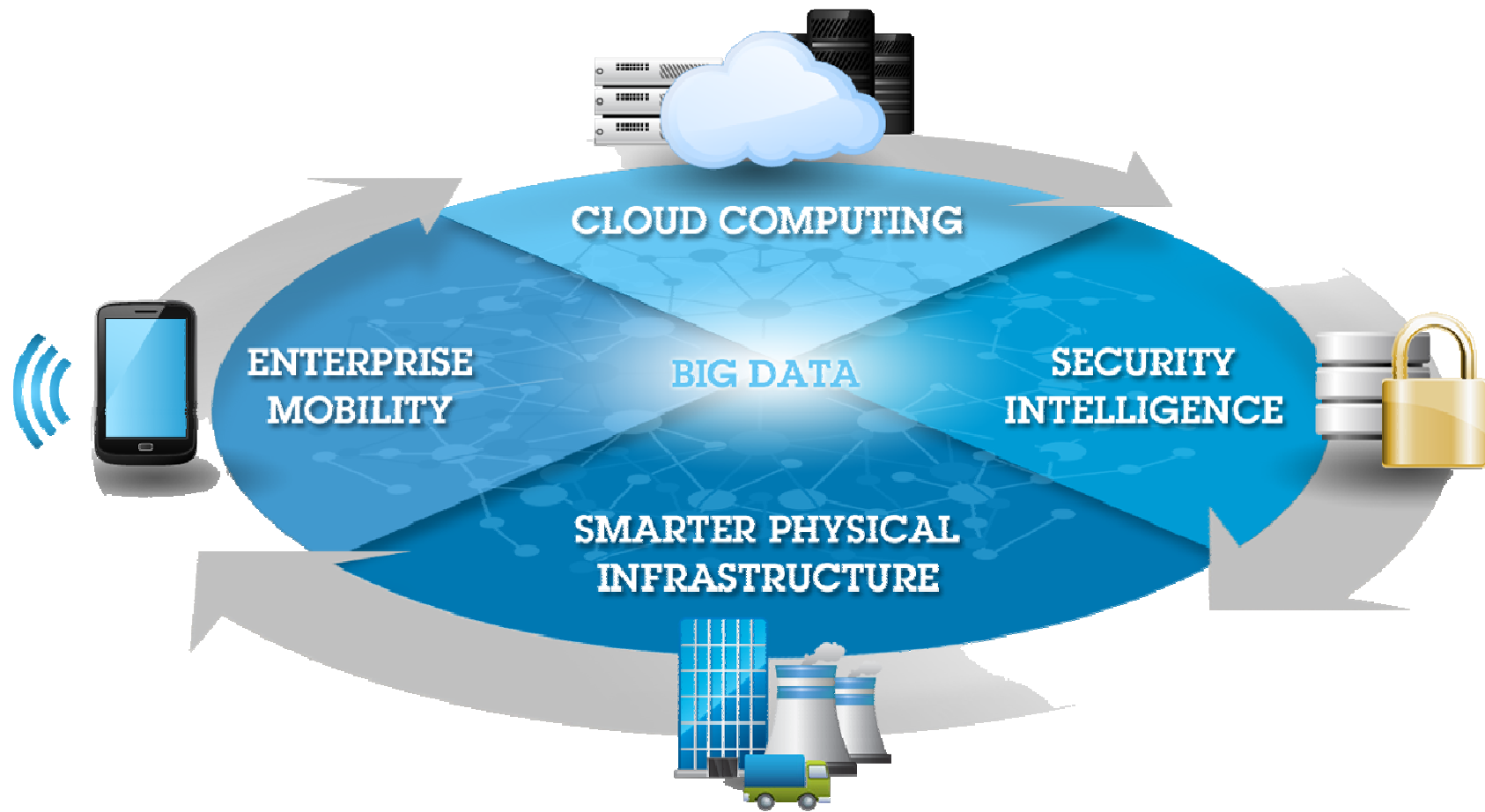






# The Way We Work Is Changing







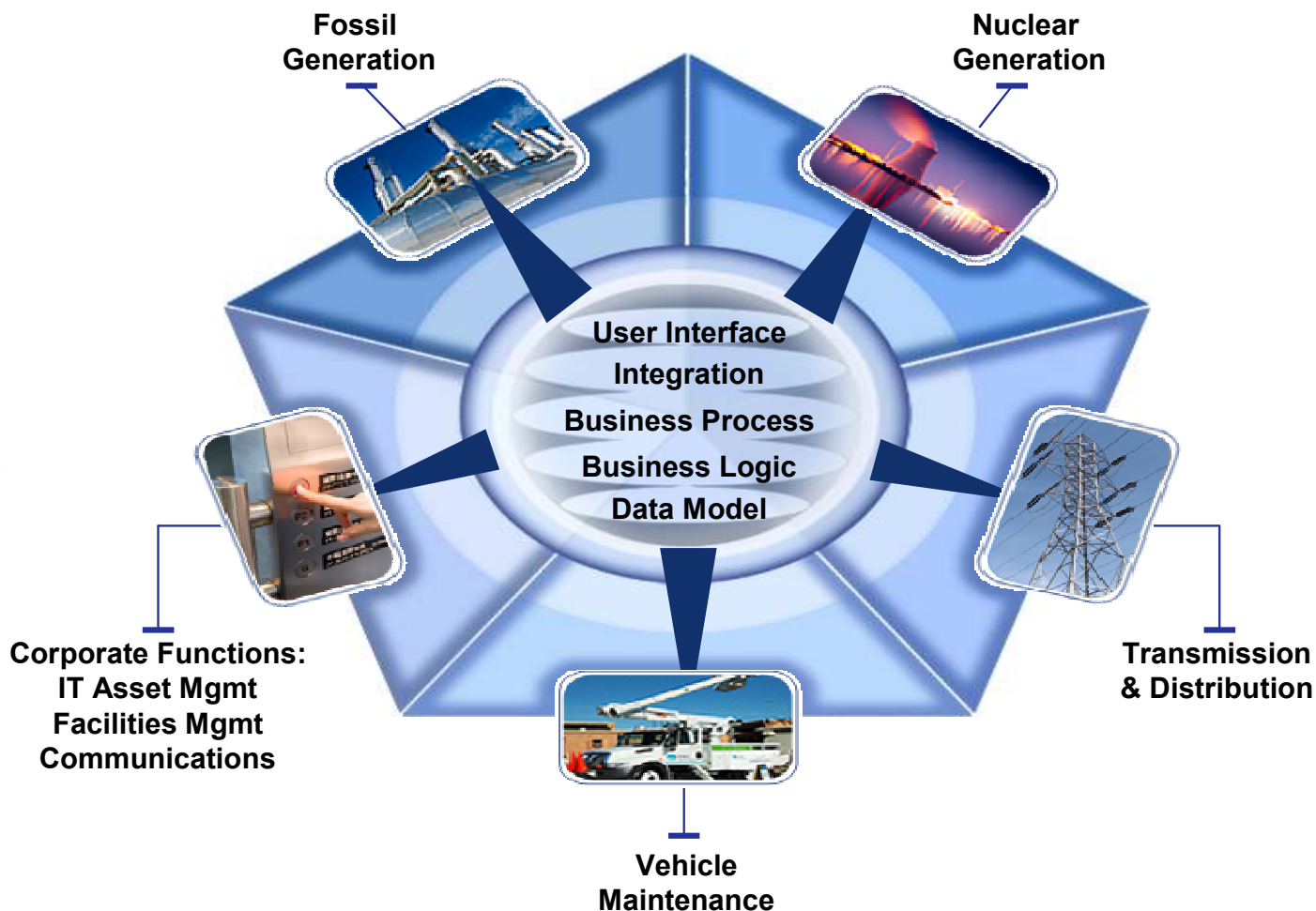
# Utility Industry Asset & Work Management

- **Single set of common business process tailored for unique requirements of each business**

- Aligned with the business objectives and processes of each business
- Driving cross enterprise reporting, adoption of common best practices and cross business sharing of resources – labor, materials, etc.

- **Single instance of H/W, S/W and Database supporting the global enterprise**

- On a modern Service Oriented Architecture (SOA) resulting in dramatic reduction in system cost and complexity
- Often very significant reduction in number of applications to support, including pop-up apps





# Why Utility Customers Choose Maximo ?

1. **Consolidate Work and Asset Management across the Utility .** Delivery: Transmission; Distribution; Substations, construction, service work Fleet, Facilities, and the generation fleet: Nuclear; Fossil; Renewables.
2. **Supports all Asset Classes.** Operating Equipment, Fleet, Facilities, IT.
3. **Maximo is a software environment to configure specific and new business requirements and consolidate point applications.** Adapt quickly to new regulatory requirements, configure specific business processes such as gas survey and leak management.
4. **Maximo Integration Framework is designed to interoperate with the entire software business ecosystem.** Preconfigured adaptors two way for Oracle and SAP.
5. **To participate in an industry best practices Community: Our Maximo Customers Maximo Utilities Working Group MUWG.** Customer run organization of over 145 Utilities with formal workshops every Spring and Fall.

*“Product Quality & User Satisfaction is where Maximo Excels”*



## Maximo for Utilities and Supporting Solutions

1. IBM Maximo is the foundation for our product
2. Maximo for Utilities provides specific T&D capabilities
3. Utilities will most often deploy Spatial, Transportation
4. Utilities now adding Scheduler, Everyplace, HSE & Service Provider





# Questions & Discussion



Our world is becoming

## INSTRUMENTED



Our world is becoming

## INTERCONNECTED



Virtually all things, processes and ways of working are becoming

## INTELLIGENT



Terry L. Saunders

Worldwide Utilities Industry Leader  
E&U. Energy & Utilities, Maximo  
Cloud and Smarter  
Physical Infrastructure

[terry.saunders@us.ibm.com](mailto:terry.saunders@us.ibm.com)

550 King Street  
Building LKG1 – A2523D  
Littleton, MA. 01460 6245  
USA (Boston Area)  
Tel +1 978 899 2627  
Mobile 1 617 513 0347



**Ron Wallace | IBM Software Marketing | Enterprise Asset Management**

**IBM** | Direct: +1 978.399.5465 | Mobile: +1 617.513.0348 | [š ron.wallace@us.ibm.com](mailto:ron.wallace@us.ibm.com)



## Questions & Discussion

“When the wind changes direction, there are those who build walls, and those who build windmills.”

-- Chinese Proverb





## Additional Details

---



