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
PAS 55 – Optimized Management of Physical Assets

Organizational strategic plan (OSP)
Vision, mission and values, business policies, stakeholder requirements, goals and risk management

Asset management policy
Mandated requirements, overall intentions/principles and framework for control of asset management

Asset management strategy
Long term optimized and sustainable direction for the management of the assets, to assist in delivery of the organizational strategic plan and apply the asset management policy

Asset management objectives
Specific and measurable outcomes required of assets, asset systems and the asset management system

Asset management plan(s)
Actions, responsibilities, resources and timescales intended to implement the asset management strategy and deliver the asset management objectives

Source: PAS 55 Part 1: Specifications for the optimized management of physical assets, BSI 2008
Initial EAM Implementation 1–2 years then Optimization: 5-10 years
Detectable Potential Failures

1. Detect potential failures with maintenance tactics
2. Execute corrective actions before failures happen

FUNCTIONAL FAILURE
Equipment not performing as expected

Performance Decrease Starts Here

Proactive Work

Reactives Work

Maximum Performance

Expected Performance
Defining and implementing a Maintenance Strategy

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

- Reduce unplanned maintenance activity
- Improve planned maintenance activity
- Reduce failures
- Consolidate compliance activity
- Coordinate operating activity
- Lower risk exposure
- Higher resource utilization
- Higher productivity
- Streamlined organizational structure
- Less administrative activity
- Improved contract management
- Improved material logistics

Improved Investment Effectiveness

- Reduce
- Improve
- Re
- CI

Without sacrificing safety or service levels

IBM Maximo

Improve Performance
Reduce the Quantity of Work
Lower Unit Cost

Improved Operational Efficiency

S...
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

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

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

Source: Citi Investment Research and Analysis

- 19% of electric generation is from renewables
  - 16% Hydro and 3% other renewable

- 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 world’s 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

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
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:

- 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

**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

**Europe:**
- A2A - AEM Torino
- A2A - ASM Brescia
- Alliander
- EDF (France)
- EDF Energy (UK)
- EDP
- EnBW
- Endesa
- Enemalta
- Enel
- ESB Networks
- Göteborg Energi
- MVV Energie AG
- Nuon
- Oxxio
- 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
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
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.
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 mi² 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
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 gas storage

**Complementary Non-Utility Growth Businesses**

**Coal & Gas Midstream**

**Unconventional Gas Production**

**Power & Industrial Projects**

**Energy Trading**

**Synthetic Fuel**
Texas is the 11th Largest Power Market in the World

Electricity consumption
2008; Million MWh

United States: 3,906
China: 3,017
Japan: 964
Russia: 858
Germany: 601
Canada: 549
India: 544
France: 461
Brazil: 420
South Korea: 402
Texas: 347
United Kingdom: 345
Italy: 315
Spain: 243

Source: EIA: Energy Information Administration

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.
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
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 digestor-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 an 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 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
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

**Slovakia**
- **Official name:** Slovak Republic
- **Formation date:** 1. January 1993
- **Established form:** republic
- **Official language:** Slovak
- **Capital:** Bratislava
- **Area:** 49,000 km²
- **Population:** 5,400,000 inhabitants

**VSE**
- **Distribution area:** 16,000 km²
- **Off-take points:** 600,000
- **Network length:**
  - HV: 1,880 km
  - MV: 8,350 km
  - LV: 13,440 km
  - Total: 23,670 km

**Shareholders**
- **State:** 51%
- **RWE:** 49%
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

PRODUCTION
Activities in competition

TRANSMISSION
RTE

DISTRIBUTION
ERDF

35 million customers
11 million operations every year
443 000 new customers connected in 2011

ELECTRICITY SUPPLY
Activities in competition
Maximo EAM in Renewables

ACCIÓNNA 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

Sustainability
Economic growth
Environmental balance
Social progress
Major presence in **five technologies**

<table>
<thead>
<tr>
<th>Technology</th>
<th>Company owned</th>
<th>Customers</th>
<th>Total (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>7,096</td>
<td>1,472</td>
<td>8,568</td>
</tr>
<tr>
<td>Concentrating solar</td>
<td>314</td>
<td>1</td>
<td>315</td>
</tr>
<tr>
<td>Photovoltaic solar</td>
<td>49</td>
<td>67</td>
<td>116</td>
</tr>
<tr>
<td>Hydropower</td>
<td>912</td>
<td></td>
<td>912</td>
</tr>
<tr>
<td>Biomass</td>
<td>57</td>
<td></td>
<td>57</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8,568</strong></td>
<td><strong>315</strong></td>
<td><strong>9,968</strong></td>
</tr>
</tbody>
</table>
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
WIND ENERGY

- Canada 181
- USA 628
- Mexico 556
- Costa Rica
- Brazil
- Chile
- Germany 150
- Spain 4,713
- Portugal 120
- Morocco
- Greece 48
- Italy 156
- Poland 38
- Hungary 24
- Croatia 30
- South Korea 61
- Australia 305

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

Maximo EAM in Renewables
Infrastructure Is Increasingly Complex
Variety, Volume and Velocity Of Data is Increasing
The Way We Work Is Changing
Building a smarter planet

Cloud Computing

Enterprise Mobility

Big Data

Security Intelligence

Smarter Physical Infrastructure
**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

550 Kina 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 | ron.wallace@us.ibm.com
“When the wind changes direction, there are those who build walls, and those who build windmills.”

-- Chinese Proverb
IBM Maximo for Utilities

Maximo Base Services

Utilities T&D EAM Functionality

Crew Management
A collection of resources working together: Skills, Crafts, Qualifications, Labor and specific people, vehicles and tools.

Crew Scheduler
Crew support to Maximo Scheduler add-on product.

Smart Meters as Assets
Asset Lifecycle Management For Revenue Meters including: Bulk receiving and Bulk Transfer

Revenue Meter Sampling
Sample Templates and Random Sampling support for meters required Regulators, Report Status and store Test Results.

Meter Alarms
Web Service to capture specific meter Alarms such as tamper or low battery To launch work order to investigate.

Task Prerequisites
Supports Administrative work requirements Identifying predecessor and successor Relationships to required work order tasks Such as an occupancy permit prior to Energizing the site.

Integration Framework ISM
Integration SDK type support downloadable, as is, from the ISM Library to assist with: Mobile Work Force Management Integration Graphical Design Tool Integration Fixed Asset Integration for Unitization

CU Compatible Units Library
Construction Estimating Standards

CU Estimating
Design Standards for Construction Estimate, comparison and selection

Maximo Spatial Asset Mgmt.
GIS Integration to Esri ArcGIS Server

Map in Maximo
Map Tab for Assets, Meters Locations, Work Orders, Service Requests

Auto Locate and Create
Find Assets, Locations, WO’s and SR’s easily on a map to Understand proximity and context

Polygon Selection Sets
Draw a specific polygon on a map and select actions: create Work Order/Inspections, etc.

Redlining
Support
Map Redline draw tools Supporting Export, Imports and Query by Attributes

Primavera Integration
Applicable to complex scheduling requirements

ERP Integration
Standard SAP and Oracle integrations available

EDM Integration
Standard FileNet integration available

Maximo Integration products

Meter Alarms
Web Service to capture specific meter Alarms such as tamper or low battery To launch work order to investigate.

Condition Monitoring
Web Service to capture specific meter Alarms such as tamper or low battery To launch work order to investigate.

Task Prerequisites
Supports Administrative work requirements Identifying predecessor and successor Relationships to required work order tasks Such as an occupancy permit prior to Energizing the site.

Integration Framework ISM
Integration SDK type support downloadable, as is, from the ISM Library to assist with: Mobile Work Force Management Integration Graphical Design Tool Integration Fixed Asset Integration for Unitization

Regulatory Tracking and Support
NERC / CIP
Asset Identification as Critical Infrastructure or relationship to Regulations. Work can be tracked as job plans supporting regulatory requirements and inspections on all related assets. Sabotage of any asset can also be identified

NERC / CIP
Asset Identification as Critical Infrastructure or relationship to Regulations. Work can be tracked as job plans supporting regulatory requirements and inspections on all related assets. Sabotage of any asset can also be identified

http://publib.boulder.ibm.com/infocenter/tivihelp/v49r1/index.jsp