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ASSET MANAGEMENT BEFORE, DURING AND AFTER AMI *with Lessons Learned*

TESCO's Meter School

TESCOOL ▶▶

July 10, 2023

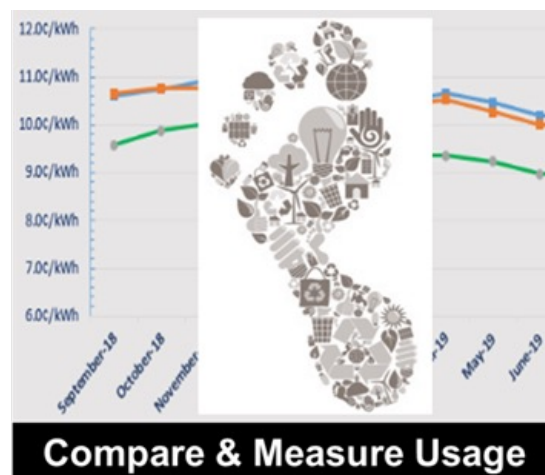
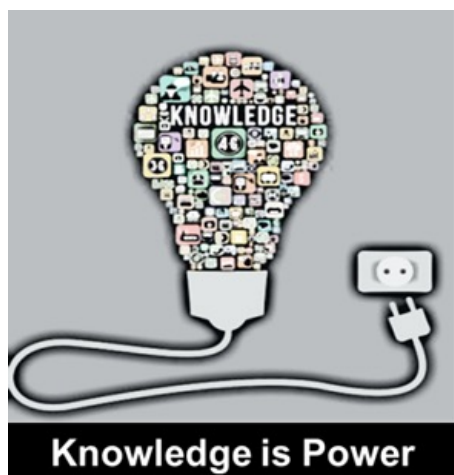
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Paul Fratellone

CONSUMER PARADIGM SHIFT

One of the main objectives of the Advanced Metering Infrastructure (AMI) smart meter initiative is to empower customers with insight, control and convenience.

The AMI smart meter initiative fundamentally transforms the relationship a utility has with its customers by enabling them to become more self-aware of their energy consumption.



UNDERSTANDING THE JOURNEY



The assets involved in this endeavor expand well beyond meters.

Your organization's view of assets under management, and how best to manage and control them, will be paramount to the ongoing realization of your investment.

Metering technology has evolved rapidly over the last few decades, and most organizations have already embarked on their own AMI deployments.

How does your organization define value?

(Which ones will be part of your business case)

- Reduced costs – Improve Operational Efficiency?
- Increased Protect Revenue – Accurate data? Optimized Performance?
- Improved service levels – Provide tactical insights for usage and trends?
- Reduced risk – Regulatory Compliance?
- Happier customers – Inform, educate, and engage

- 1. Rank your business goals**
- 2. Identify and baseline KPIs**
- 3. Create models, determine patterns, spot trends and understand behavior**
- 4. Measure**

Asset Management enables

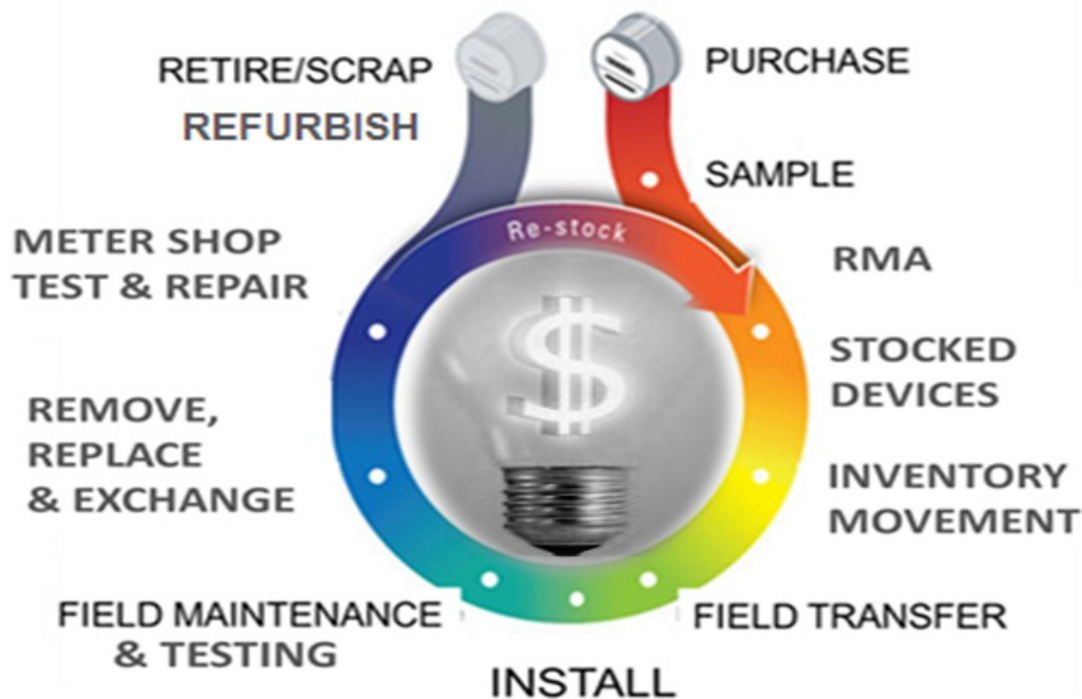
- Effective control and governance of investments in your assets
- Realization of value through managing risk and opportunity
- Achieving the desired balance of cost, risk and performance.

An asset management system provides an ideal framework for the identification, understanding and integration of the many technical standards, codes, guidelines and best practices that affect the organization



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LIFECYCLE MANAGEMENT



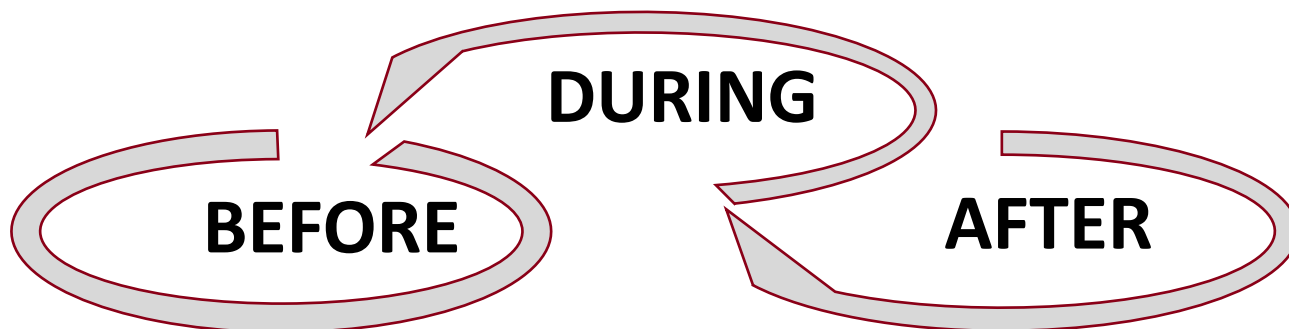
Integration with asset management will enable comprehensive lifecycle tracking of all your assets under management.

Including your Personal Protective Equipment, PPE & Tools



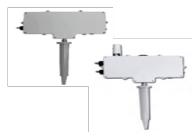
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WHAT, WHEN AND WHAT'S NEXT?



Smart Meter / Module

The Smart Meter transmits interval and daily register reads, as well as events and alarms, through the AMI mesh network to the AMI Head End System (HES)



AMI Head End System (HES)

The AMI HES requests data from all AMI connected devices in the field and provides meter and network device data to the MDMS for processing



Meter Data Management (MDM)

Every 4 hours the MDMS will perform billing quality validation and estimation of all received data and make it available in the system for additional analysis



Customer Information Mgmt. System (CIMS)

At billing time, CIMS will request billing reads from the MDMS. Depending on the customer's rate classification, the MDMS will calculate the appropriate billing response and provide actual or estimated reads, as available



GETTING AHEAD OF THE CURVE

- Is my asset management system able to handle all the new AMI data and the business workflows?
- Where am I going to physically store all of these meters?
- Where do we store retired devices until scrapped?
- How many meters should be tested? How do I track functional tests in addition to accuracy?
- Can I get special dispensation to reduce In-Service/Random testing for AMI meters from the PUC/PSC?
- Is the system of record for deployment/installations able to handle AMI devices?

Questions?



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PREPARING FOR THE WORK AHEAD

Stock levels and the logistics of storing and handling devices

Determine lead times for all required equipment and stock levels to ensure uninterrupted installations

Be able to efficiently handle and process rejected devices and entire shipments (RMAs)

Ability to efficiently process and record functional testing as well as accuracy

Determine which existing systems will need to be updated or replaced and the sequence of work.

Establish system(s) of record for business operations/workflows and know your integration touch points between systems

Thoroughly vet your software, hardware, and installation partners; get references

Efficient processing of retirement, disposal/recycle, and refurbishment of devices

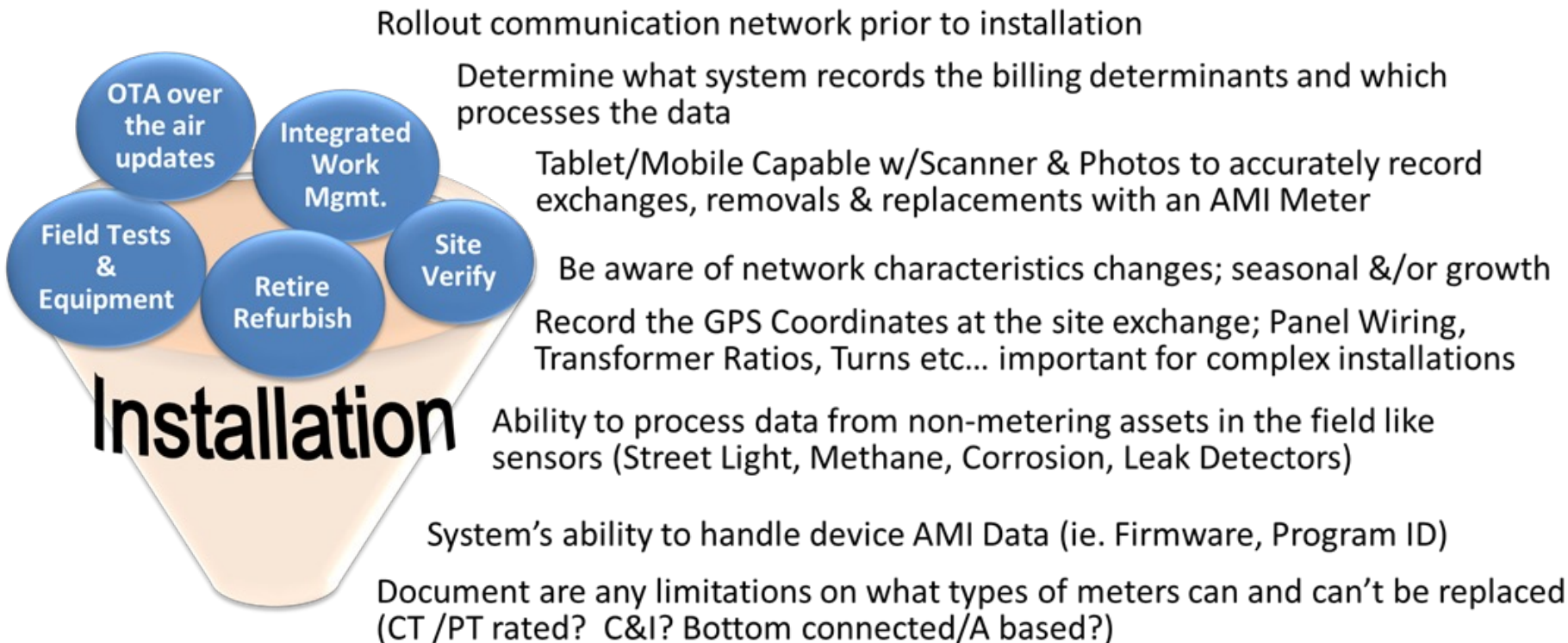


The ability of the organization to deliver as a cohesive unit will require constant focus and direction from leadership



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HANDLING THE DAY-TO-DAY WORK





DELIVERING TO EXPECTATIONS

Before field deployment can take place it's best to have a comprehensive understanding regarding what is currently in the field.

- Know the size and type of the meter(s) at each premise, having this info will assist in helping the field installers understand what they need to load on their trucks each day. This also helps determine what needs to be ordered from each supplier.
- Make sure you have some mechanism to track stock re-order points and be sure to include lead time that may include your AQL process.

Your Meter installation Vendor, MIV, should understand up front, if there are any limitations regarding what types of meters can and can't be replaced (CT /PT rated, self-contained? etc...)



DURING THE EXCHANGE

- Have a detailed process for no access and opt out locations. When / if contracting out meter installations/retrofits, be certain to describe in detail what the vendor needs to do for conditions
- Have a detailed process around the “unable to install/complete” Don’t simply indicate in the RFP that a vendor needs to try access 5 times before returning the job to your company and believe that’s adequate...
- Utility should randomly check jobs returned to be sure they are valid and that there will be penalties for jobs returned in error.
- Have a plan to handle the retired devices that will be coming back from the field. A refurbishment process could be considered for some devices and that could provide some financial benefit to the organization.
- When removing your old mechanical meters, make sure your partners take special care as these meters are susceptible to damage if not stored or transported correctly. Failures on retirement due to meter damage may be difficult to explain to your regulatory agency.



Communications/Network Devices

More art than science, placement of network communication devices is key to AMI system performance.

Consider that the network characteristics may change with the season or when bushes or trees grow or get their leaves. And don't be naive.... The technology selected may not be able to communicate with all meters and more than one method may be needed to communicate with EVERY meter.

When contracting with hardware provider consider placing an upper limit on network device that your company will pay for.

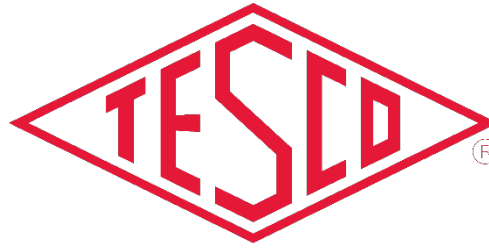
There could be a tendency during the RFP response process to understate the quantity of network equipment necessary for your application to lower cost. When selecting the winning vendor be sure to account for such practices.



COMMS./NETWORK DEVICES CONT'D

You may want to indicate that the network design is 90% accurate and therefore you will pay for up to X% additional devices to achieve a stated reading goal. Example will pay for up to 5% additional network equipment in order to achieve a 99% read rate. Anything above that quantity is the full responsibility of the equipment vendor... hardware, installation and maintenance.

- Consider a program for backup battery replacement in network devices. This is not a short term issue, but eventually you will need to replace the battery.
- Consider that much like computer equipment that network devices may need to physically updated/refreshed during the term of the project.
- Be prepared for siting problems and issues. Much like opt out customers may object to network communication devices mounted too close to their homes. Have a Q and A booklet and/or outreach program to explain about the effects of RF.



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THE SHOULDA, COULDA, & WOULDNA



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GENERAL PROJECT EXPERIENCES

- Lack of electronic process documentation created a significant hurdle
 - “As-Is” workflows had to be mapped out for nearly all aspects of the project
- Few employees that actually understood the current legacy systems remained in the company
- Project team members were allocated on a part time basis, which extended the duration of the project
- The project team was tasked with transitioning the “As-Is” process for the test system
 - The correct course of action would have been to do a full “business process re-design”
- Lack of inventory tracking for the consignment (people/trucks) process should have been addressed before deployment

GENERAL PROJECT EXPERIENCES

- Perform a business process redesign to identify gaps in your current processes
 - Solicit input from other departments
 - Establish the system of record for data and workflows
 - Streamline your data integrations and touchpoints
- Assign dedicated, full time resources to your Meter Management System project
- Upgrade your meter testing technology



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GENERAL PROJECT EXPERIENCES

- Correct source data system issues before data migration and conversion
- Allocate additional effort for data validation and verification in the new system
- Expand your system integration tests to include error conditions
- Upgrade one system at a time vs. doing multiple integrations simultaneously
- Let your billing system be the last system to get updated
- Ensure your RMA process and rejected shipment processes are robust

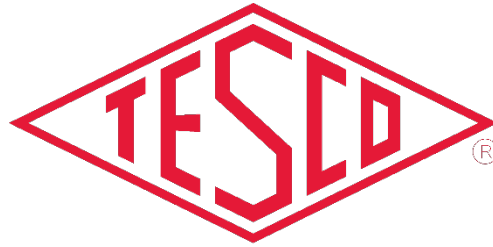


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IMPACTS TO THE METER SHOP

- Sample testing of high volumes of new meters can quickly add strain to a meter shop
- Concurrent end of life testing competes for available bandwidth
- Storage of meters can quickly become a pain point for the shop
- Many meter shops have not upgraded their test equipment in years
- Multi-position test boards can increase testing throughput
 - Integration of multi-position boards is much easier to facilitate as part of the overall system upgrade
 - Integration of multi-position boards post deployment often require an additional software release
- Post AMI deployment communications and register firmware upgrades will take place
 - Multi position test boards or multi position warm up boards help speed up this process

- Develop meter procurement contracts with 2 vendors and confirm meters read over AMI network prior to start of deployment.
- Install meter deployment work system with meter scanning technology prior to deployment.
- Develop detailed installation schedule for complete project to include all meters (residential, commercial and industrial).
- Develop timetable to recognize AMI benefits
- Staff and train an AMI Meter Data Analytics team



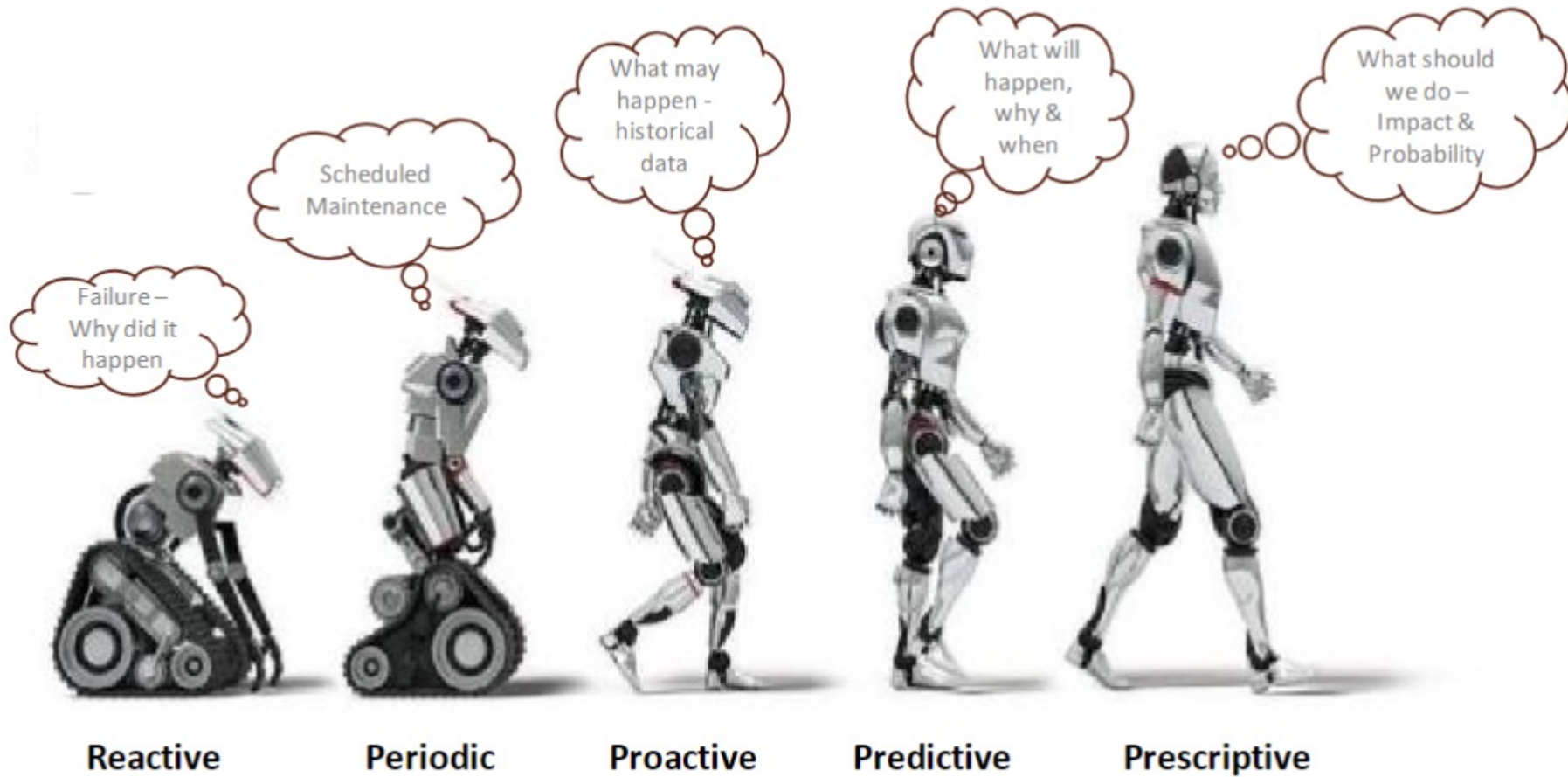
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WHAT'S THE END GAME



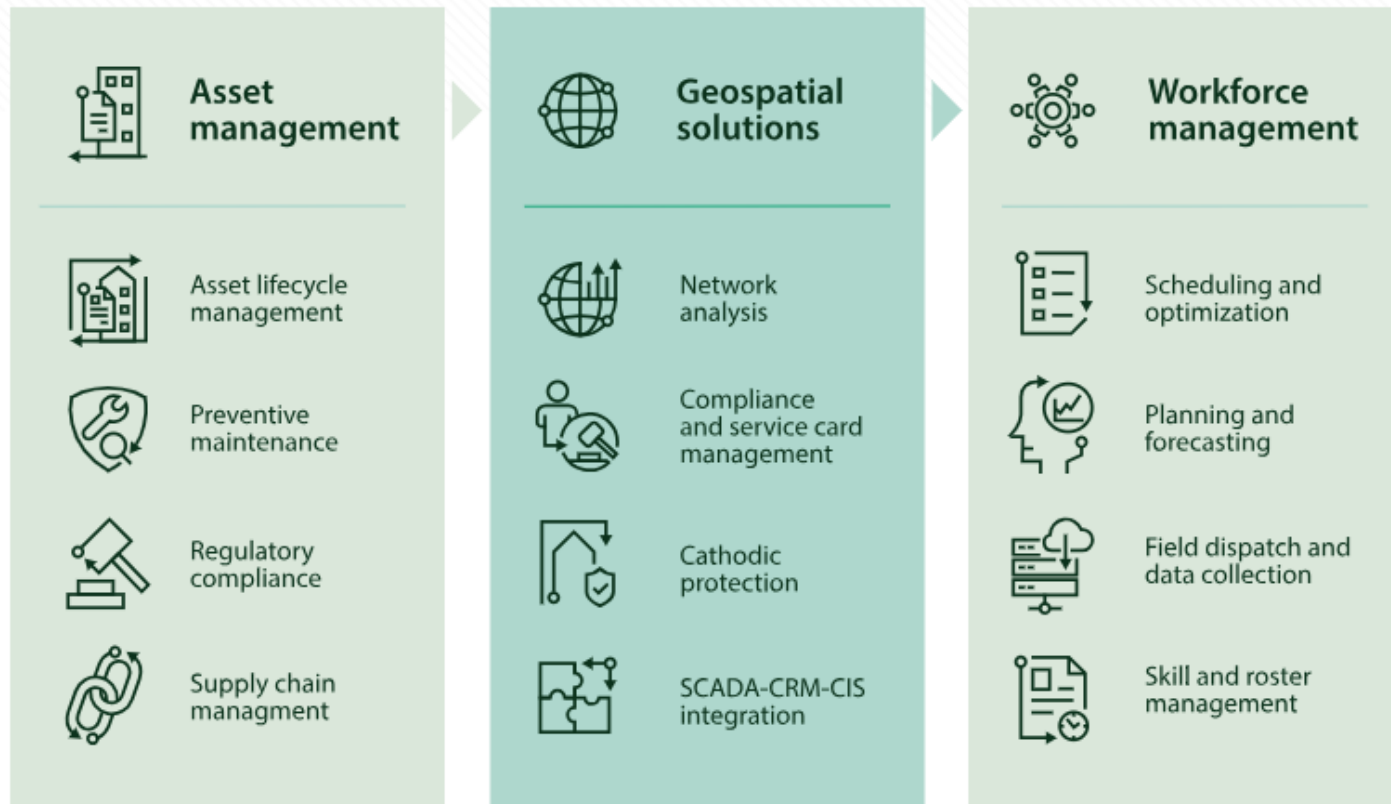
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EVOLUTION & TRANSFORMATION



THE INTEGRATED PORTFOLIO

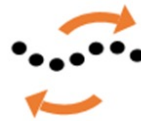
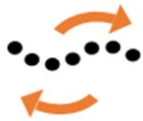
Choosing the right asset & inventory management system for your organization will ensure the value required from the “cash register” will deliver the expected payback period and rate of return





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INTEGRATION: MAXIMIZING BENEFITS



Smart Meter / Module

Work Management

AMI Head End System (HES)

Meter Data Management (MDMS)

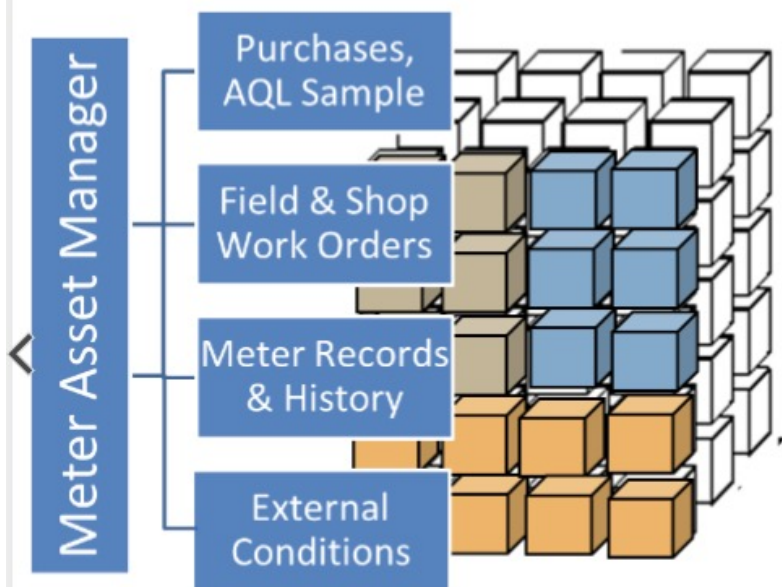
Customer Info System (CIS)

- ✓ Receive and create the devices from the manufacturer file.
- ✓ Perform acceptance testing
- ✓ Create devices on HES and CIS after acceptance
- ✓ Track devices down to the truck level
- ✓ Cross check meter assignments against meter installations
- ✓ Track removed meters back to the shop
- ✓ Equipment kits for CT/VT installations
- ✓ Maintain consistency between HES and CIS
- ✓ Find installed meters not on HES
- ✓ Find meters on HES not shown as installed
- ✓ Firmware and Program ID OTA updates are automatically communicated and any changes to billing K are made
- ✓ Calculates the billing multiplier for cross-checking against CIS based on devices (meters, CTs, VTs) set at premise






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METER ASSET ANALYTICS



Predictive and Actionable
Information

-  What MFG model / configurations / firmware / program ID had the most AQL Failures – RMA
What's the breakdown of AQL failures/reasons
 - ✓ Accuracy
 - ✓ Functional
-  What MFG model / configurations / firmware / program ID had the most field failures - What's the breakdown of work orders/reasons
 - ✓ What's the cost of field service tech / truck roll
 - ✓ What's the cost of meter shop technician
-  Weather / Storm data
Area Outages dates
Seasons in which outages occurred
Power surges (date, time, intensity & duration)
Customer Inquiries / Calls

QUESTIONS AND DISCUSSION



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