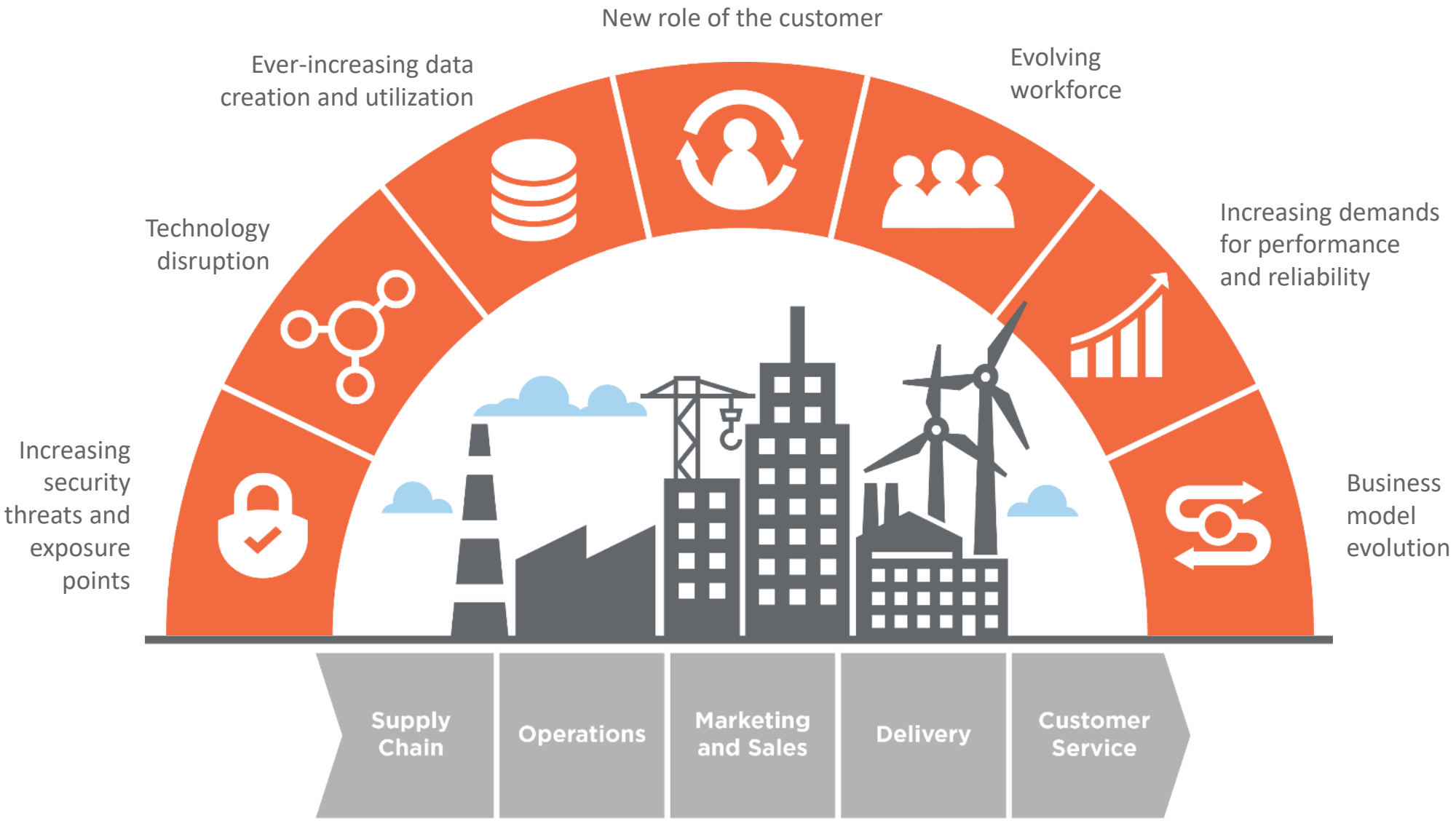
AMI Meter Data at the Core of New Operational Analytics

Presented by:

Alex Piquer MBA

Director of Technology Consulting

The new operational reality



We continue our pioneering spirit

Our capabilities

- Business strategy
- Business transformation
- Corporate innovation
- Strategic asset planning
- Asset due diligence
- Business intelligence & analytics
- Capital planning
- Financial analysis & rate design

- Enterprise system integration & cloud strategy
- Software solution development
- Spatial applications & consulting
- Oracle Primavera Technology consulting

- Cybersecurity
- Risk & Reliability

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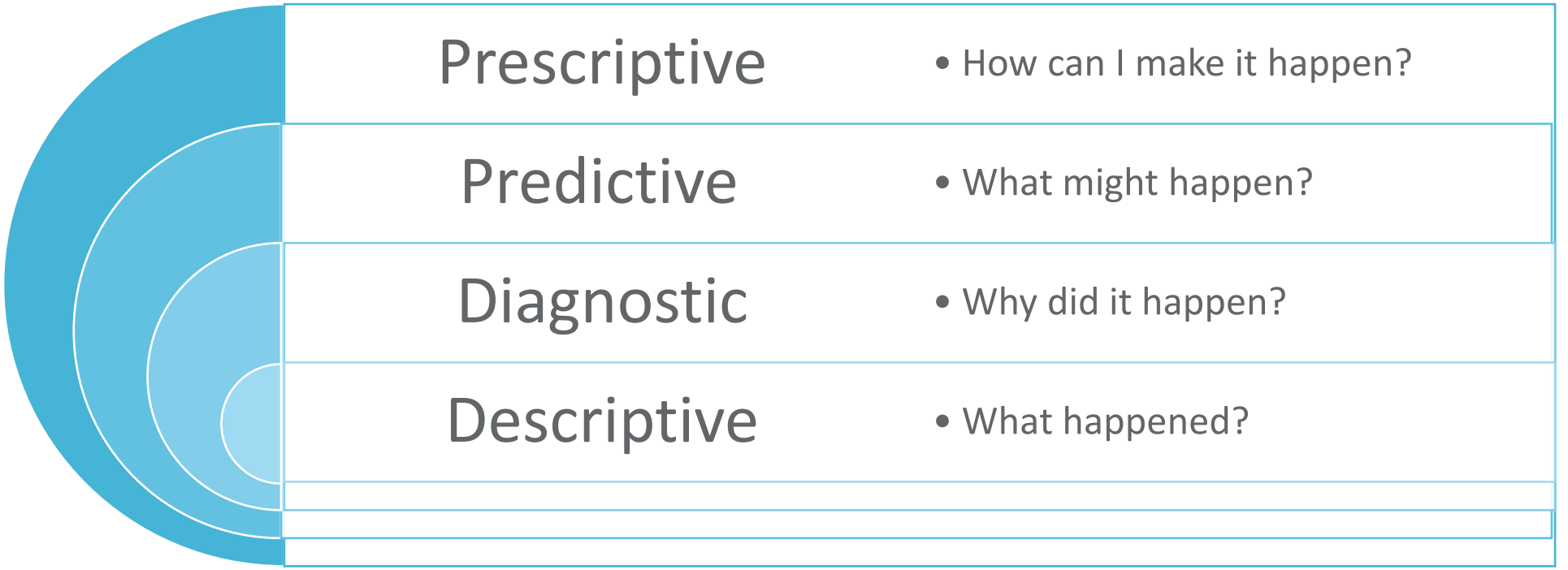
Overview: Stages of Analytics

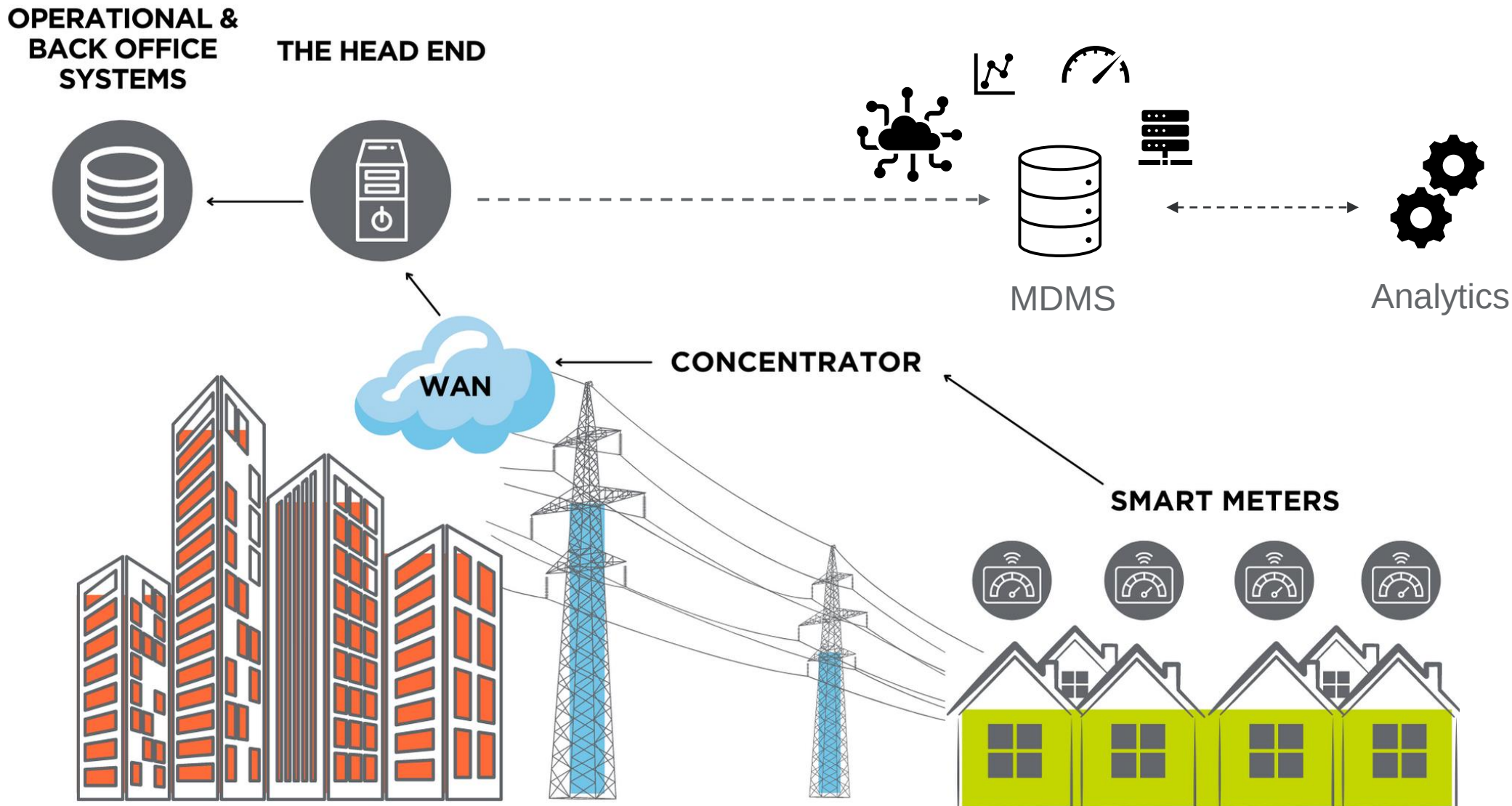


What is Advanced Metering Infrastructure (AMI)?

US Department of Energy:

> *Advanced metering infrastructure (AMI) is an integrated system of smart meters, communications networks, and data management systems that enables two-way communication between utilities and customers…*

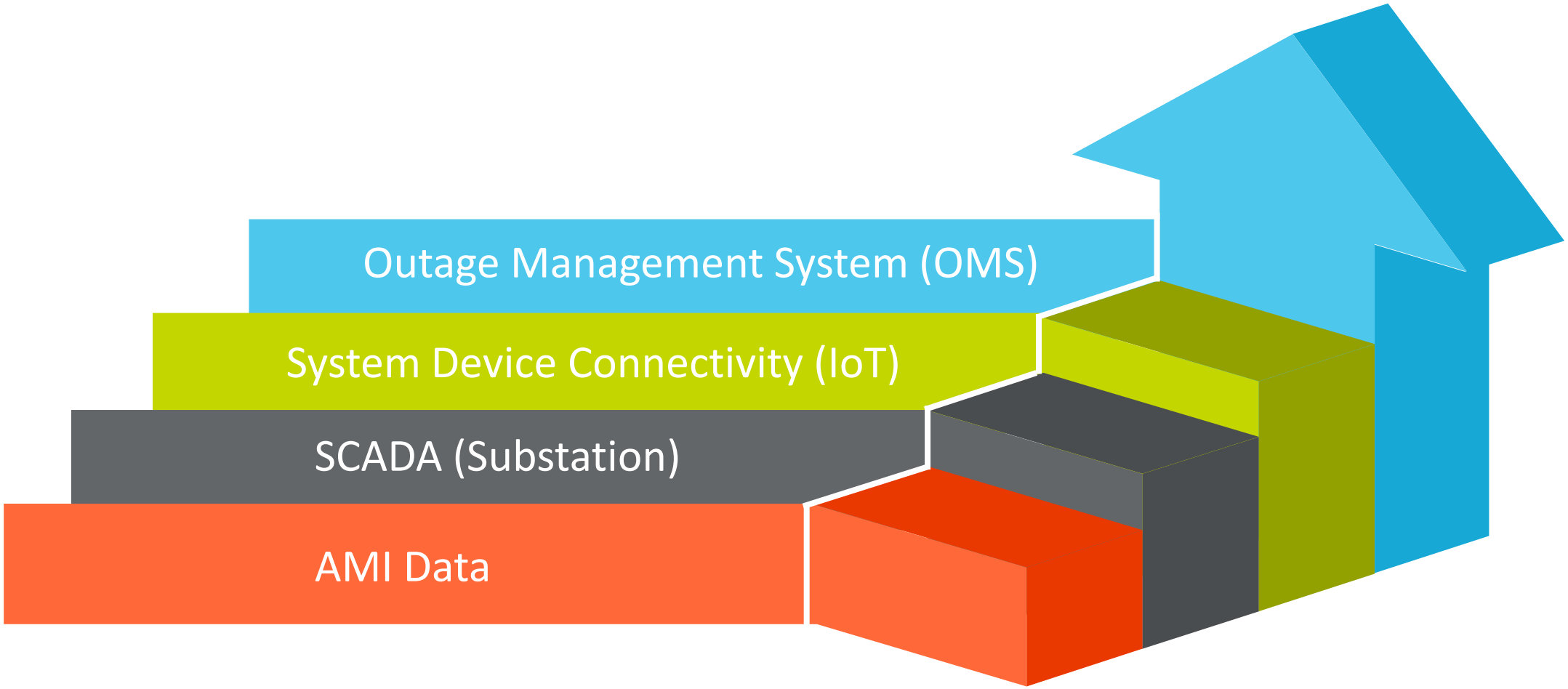
Key Components



AMI Introduction

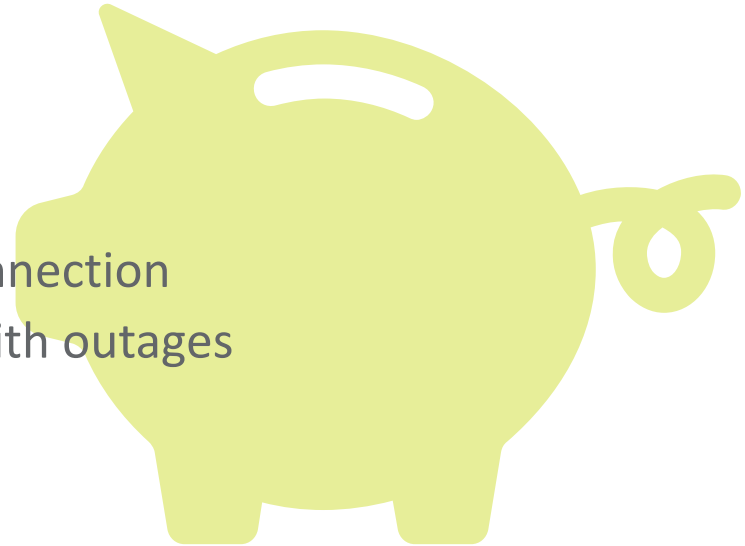
- Meter data enabled by AMI is often thought of as a key data source when looking for insights in customer behavior and customer trends.
- When combined with other data sources, meter data becomes a powerful operational tool.
- Meter data can be used to enhance operational and planning capabilities.

Additional data sources increase analytics value and outcomes.



Utility Impacts

- Match Supply to Demand
- Reduces operations costs
  - Reduces metering and billing costs
  - Reduces time and truck rolls for connection and disconnection
  - Faster outage restoration times / isolating customer with outages
  - Tamper and theft identification
- Supports customer programs
  - Impacts customer-use patterns, web portal, selection of rate program, demand-response
- Data-driven
  - Customer analytics
  - Operations, engineering, technical and budgetary planning



This is not new…why now ?

- Supply / demand disruption
- Increased complexity in distribution
- Increased system reliability demand
- Technology is enabling advanced use-cases

AMI Analytics Challenges

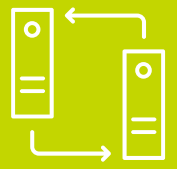
- Cost / scale
- Security
- Data variability
- Do not interfere with $$ application

Enablers

There are multiple technologies that have become readily available and driving change.

Big Data

Availability of big data tools, data science skills and advanced analytics such as machine learning



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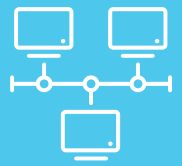
Communication

Deployment of utility owned fiber optics, private LTE and 5G create higher bandwidth backhaul and lower cost aggregation



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Cloud

Faster access to the latest analytics and big data tools. Avoidance of long-term technology commitments

03

GIS Standardization

The ESRI utility network model is helping standardize asset meta data and device topology

04

AMI Applications

Beyond the Billing Cycle

Diagnostic
Descriptive

Network Model Validation

- Meter to transformer mapping
- Phase mismatch identification
- Topology errors
- Critical for ADMS solutions
  - OMS
  - DMS
  - DERMS

Diagnostic
Descriptive

Grid Reliability: Asset Management

Enterprise asset management

- Outage / maintenance response
- Identifying failing assets
- Capital budget planning

Vegetation Management

Predictive

Grid Modernization

- Forecasting
  - Rooftop PV, battery storage
  - EV penetration
  - Improve distribution planning models

Load Analytics: Anomaly Detection

- Non-technical losses
  - Unmetered loads
  - Incorrect allocations
  - Theft
- Bad data detection
  - Missing data
  - Unusual usage patterns
  - Communication failures

Demand Side Response

- Real-time situational awareness
- Granular data and control capabilities
- Integration of PV / EV resources

Operational Analytics: Leveraging AMI Data Now

- Significant disruption and added demands to grid operators
- Dozens of operations use-cases leveraging AMI data
- Barriers lowering quickly
- Scope and planning are crucial
  - Data governance
  - Use-case complexity
  - Technology / resources / investment

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