AI/ML IN UTILITIES

DUM 2023

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Agenda

- Why AI/ML?
- How to run AI/ML in Utilities?
- Where to leverage AI/ML?
- Case Studies

Artificial Intelligence/Machine Learning is the centerpiece for business transformation

Operations

Decision making

Innovation

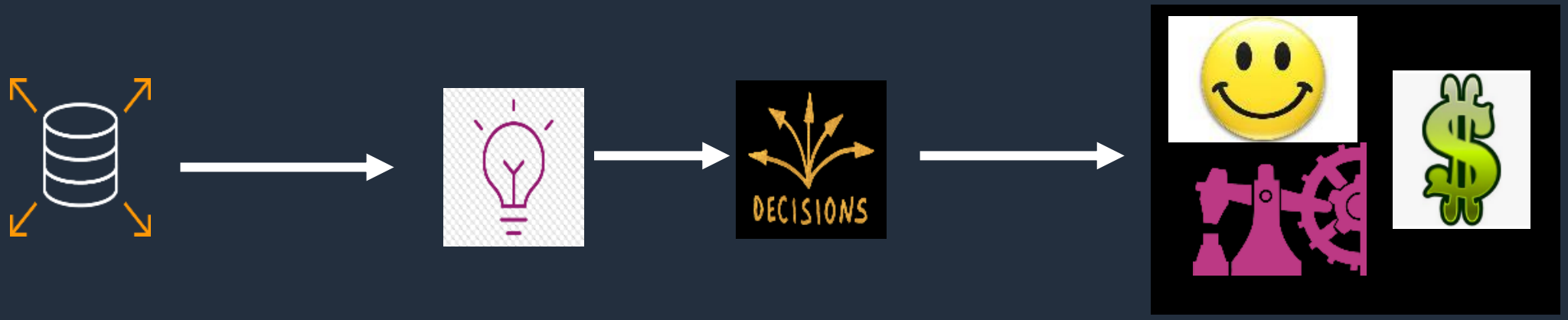
Competitive advantage

40% of digital transformation initiatives supported by AI in 2023

—IDC 2018

Why AI/ML Matters:

Increase the speed and value of data-driven decisions



Data Insights Decisions Business Outcomes & Value

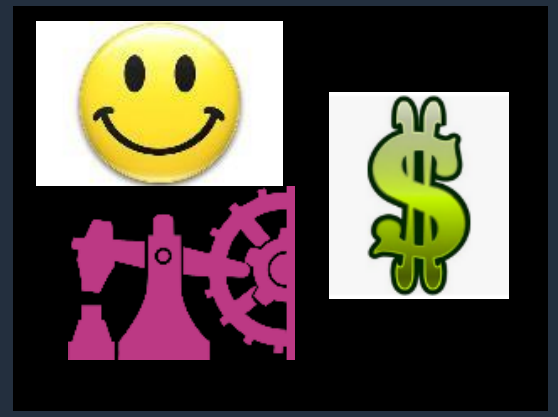
Usually manual and time consuming

Why AI/ML Matters:

Increase the speed and value of data-driven decisions

Data

AI/ML-based, near real-time, automated Insights and Decisions



Better Outcomes, Greater Value; Faster

Electric Utilities: Automated inspection, preventive maintenance, demand management, and theft detection could raise EBITDA by 20-30%.

"Artificial Intelligence: The Next Digital Frontier?" , McKinsey Global Institute.

How to run AI/ML in Utilities?

Utility Data Lake – Precursor for AI/ML

- Smart Metering
- SCADA
- DMS
- ERP
- GIS
- Work Force
- Energy Settlement
- Power Quality

Regulatory compliance reporting

Energy command center/ Smart meter operations center

AI/ML use cases – demand/ supply forecasting, ToU segmentation, Theft Analytics, Asset Performance Monitoring

Data Warehousing

Analytics

Machine Learning

Images, XML files, CSV files, RDBMS tables

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Data Lake

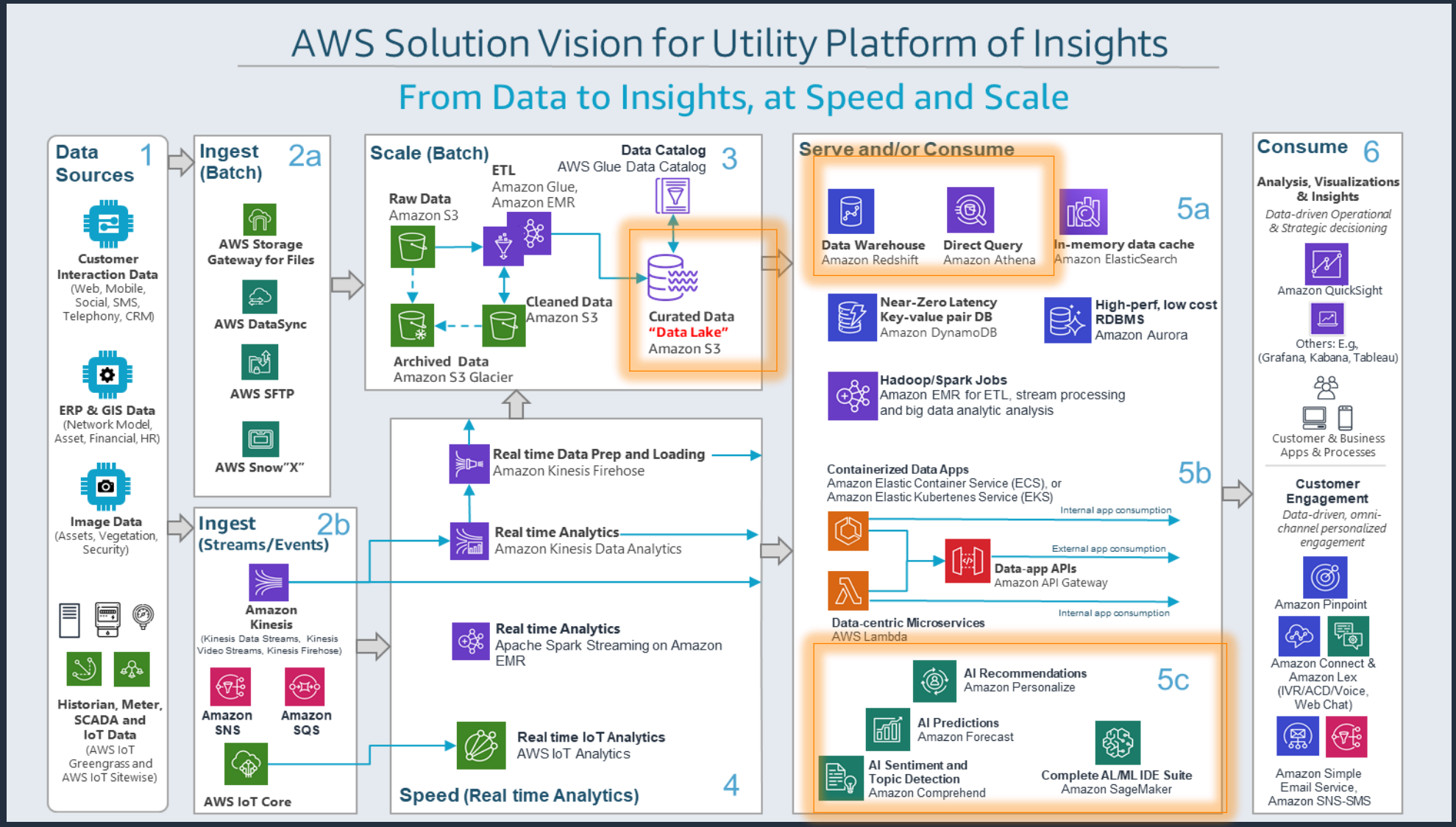
- Billing & CIS
- Energy Accounting
- Outage Management
- Fraud Management
- Demand Forecasting
- Demand Response

A single storage layer (S3) for all analytics and ML

A service to build secure data lakes in days

The fastest way to go from zero to insights, covering all data for all users

Utility Data Insights Framework for Analytics

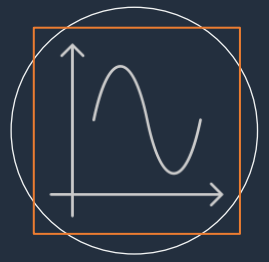


Where to leverage AI/ML?

Drivers for Adoption of AI/ML

Increasing Renewables and DER

Optimal injection and dispatch of renewables



Customer Engagement

Personalized engagement with customers

Asset Planning and Optimization

Reduce asset down times

Revenue Protection

Fraud detection and reduction

Customer segmentation on payment behaviors

Operational Efficiency

Reduce Outages
Better peak load management etc.

Power & Utilities AI/ML Use Cases

Language and Speech Processing

Customer Care

- Contact center personalization
- Outage information capture

Application Bots

- Contextual customer engagement
- Social media interaction

Safety Analysis

- Corrective action plans root cause capture
- Switch order tracking/confirmation

Machine Learning

Energy Delivery

- Load forecasting
- Outage prediction
- Outage Mitigation
- Generation scheduling
- EV charging optimization
- Dynamic Line Rating

Asset Optimization

- Veg Management
- Remote Inspection
- Predictive maintenance
- Operational performance insights
- Virtual situational awareness

Personnel

- Crew efficiency
- Crew competency

Geospatial and Computer Vision

Facial Recognition

- Substation biometric access verification
- Control room access controls
- Crew identification

Fault Prevention

- Drone Lidar and IR analysis
- Geospatial model correction

Safety Improvement

- Predictive maintenance
- Safety wear compliance

Deep Learning Frameworks

Customer Engagement

- Cust. Defection/Churn
- Next best action
- EE recommendations
- EV/PV install prediction
- Energy theft detection
- Energy usage optimization

Trading

- Algorithmic trading
- Bid optimization
- Transactional power markets

DER/RER Management

- Demand response
- Intermittent energy generation dispatch
- Renewable energy siting

Popular AI services for E&U

Amazon Monitron

End-to-end system for equipment monitoring to detect abnormal machine behavior and enable predictive maintenance

Amazon Lookout for Equipment

Detect abnormal machine behavior using existing industrial sensor data

Amazon Forecast

Predict Energy usage/demand at the customer, Feeder or plant level

Amazon Rekognition

Automate image and video analysis with pre-trained or customer CV models

Case Studies

More machine learning happens on AWS than anywhere else

10,000+

customers have used machine learning on AWS

81% of deep learning in the cloud runs on AWS

85% of TensorFlow projects in the cloud run on AWS

AWS holds the top spots on Stanford's deep learning benchmark, DAWN, for fastest training time, lowest cost, lowest inference latency

AI/ML IN UTILITIES

PSE Predicts Customer Energy Usage with Amazon Forecast

Challenge

- Puget Sound Energy sought to forecast electric and gas consumption at a typical residence.

Solution

- PSE uses Amazon Forecast to produce more accurate energy usage predictions at customer homes and businesses.

Benefits

- Started using Amazon Forecast to forecast energy consumption 30 days out with virtually no manual effort.
- Will be able to identify custom energy savings programs and services, ultimately reducing customer bills.

- Company: Puget Sound Energy
- Country: US
- Website: PSE.com

> "With the increased emphasis on environmentally-friendly energy solutions, the ability to produce more accurate energy usage projections at each of our customers' homes and businesses will be essential for energy service providers like PSE. With these enhanced analytical capabilities, PSE will be able to identify custom energy saving programs and services, ultimately reducing customer bills."
>
> **Paul Johnson,** Sr. Cloud Architect, PSE

About Puget Sound Energy

Puget Sound Energy (PSE) is Washington state's largest utility, supporting 1.1 million electric customers and 825,000 natural gas customers in communities in 10 Washington counties.

aws power and utilities

AWS AI/ML Use Case: Woodside
Predictive Maintenance and Intelligent Assets

- Woodside runs 6,000 analytics models and three million daily calculations against their LNG plants to monitor equipment and enable preventative maintenance before major issues occur

- Fused IoT, AI/ML and Robotics to create “Intelligent Assets” to better achieve remote Situational Awareness

Thank you!

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Why AI/ML Matters

Artificial intelligence and machine learning (AI/ML) are key enablers for digitalization and innovation, that will help companies differentiate.

IDC: 40% of digital transformation initiatives will take advantage of AI, and that 2021, global spending on AI and ML technologies will exceed $50 billion.[1]

Accenture: 42% of executives say AI will drive innovation in their organization and is part of their strategic plans[2]

[1]("Worldwide Spending on Cognitive and Artificial Intelligence Systems" March 22, 2018, IDC.)
[2](Shook, Ellyn and Mark Knickrehm, "Reworking the Revolution: Future Workforce," 2018, Accenture.)