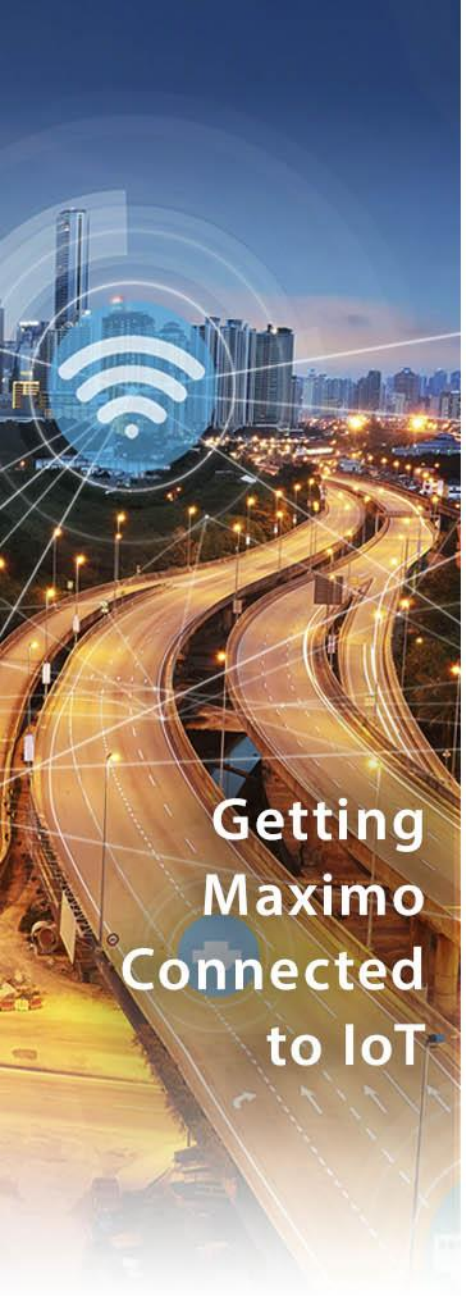
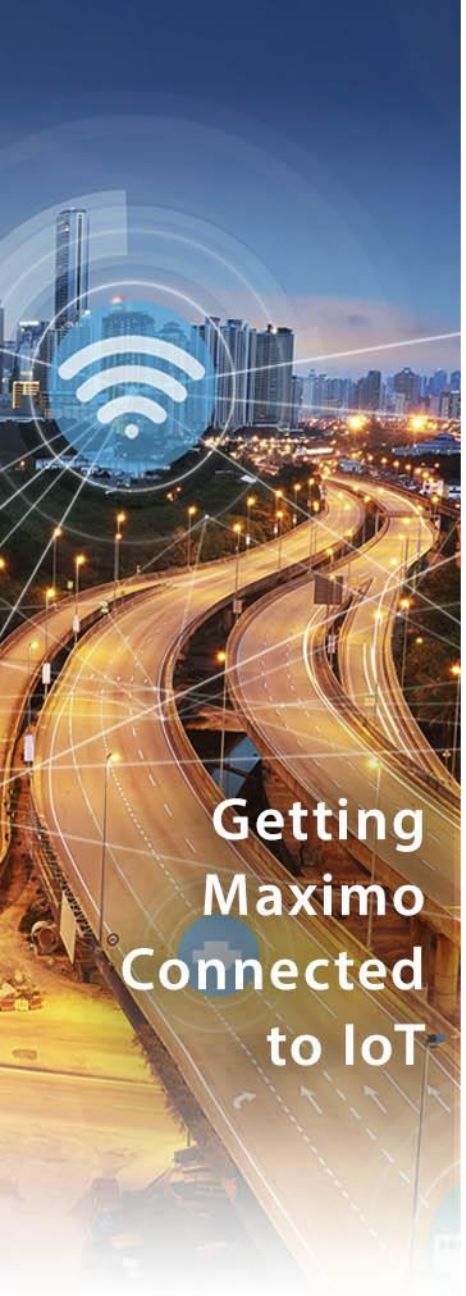

Getting Maximo Connected to IoT
Wednesday, July 15th | 8:00 AM - 9:00 AM
edi
An ARORA Company
ARROW



Speaker Introductions

Rebecca Sendel
Arrow Electronics, Inc.
IoT Brand Executive

Scott Yates
Electronic Data, Inc. (EDI)
Chief Operating Officer



Agenda

- Why IoT?
- What is IoT?
- Where Do You Start?
- Selecting the Right Use Case
- Example Pilot & Technical Design
- The Maximo APM Suite

IoT is About Solving Business Challenges

Collect and analyze data to drive business outcomes

It’s All About Business Outcomes

Operational Efficiency

Reduce Risk

New Business Models

Customer Experience

Decrease Costs

Increase Revenue

IoT Projects are Driven by Operational, Revenue and Customer Factors

Cities

- Improve quality of life for citizens
- Improve public safety
- Spend public money wisely

Industry

- Reduce operational costs
- Improve worker safety
- Maximize revenue by providing better products and services to customers

Retail

- Maximize revenue by providing better products and services to customers
- Reduce operational costs

Environmental

- Protect the environment
- Improve quality of life

Medical

- Improve patient care
- Optimize operational expenditures
- Improve quality of life

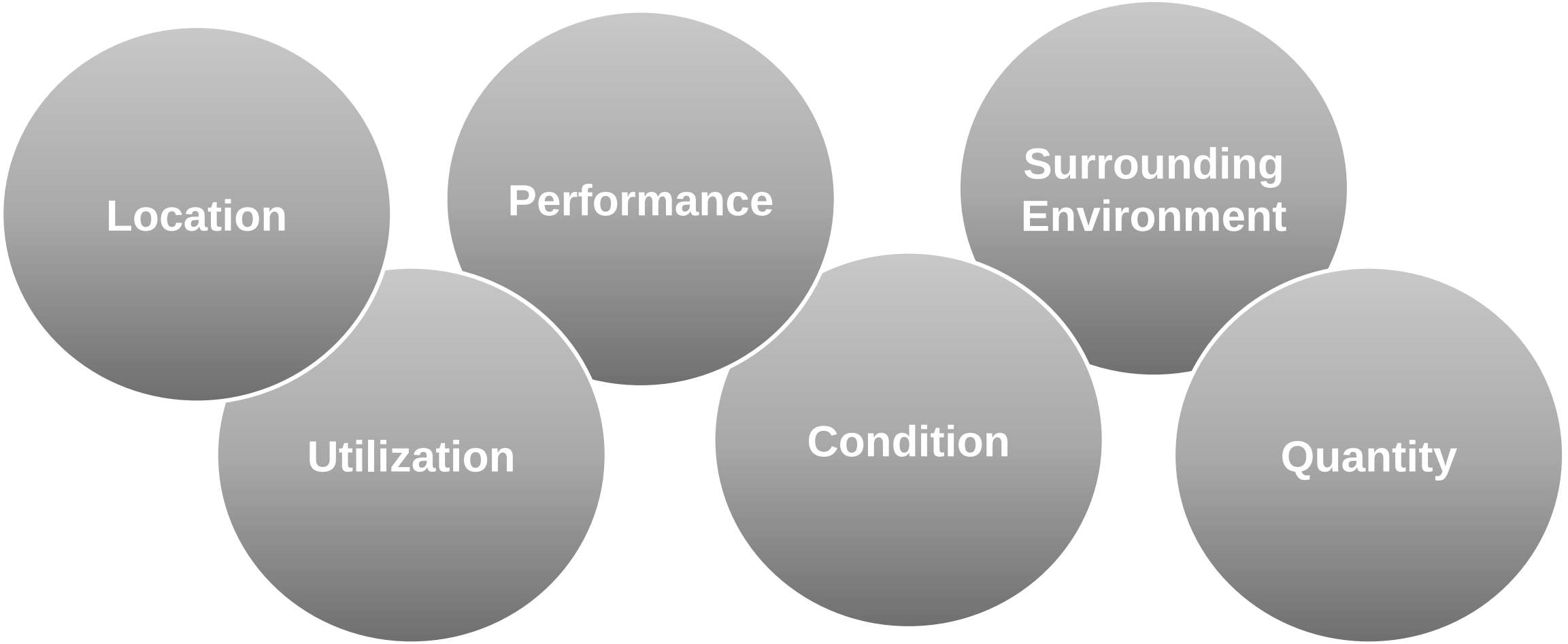
Agriculture

- Maximize yield
- Reduce operational costs
- Maximize revenue by providing better products and services

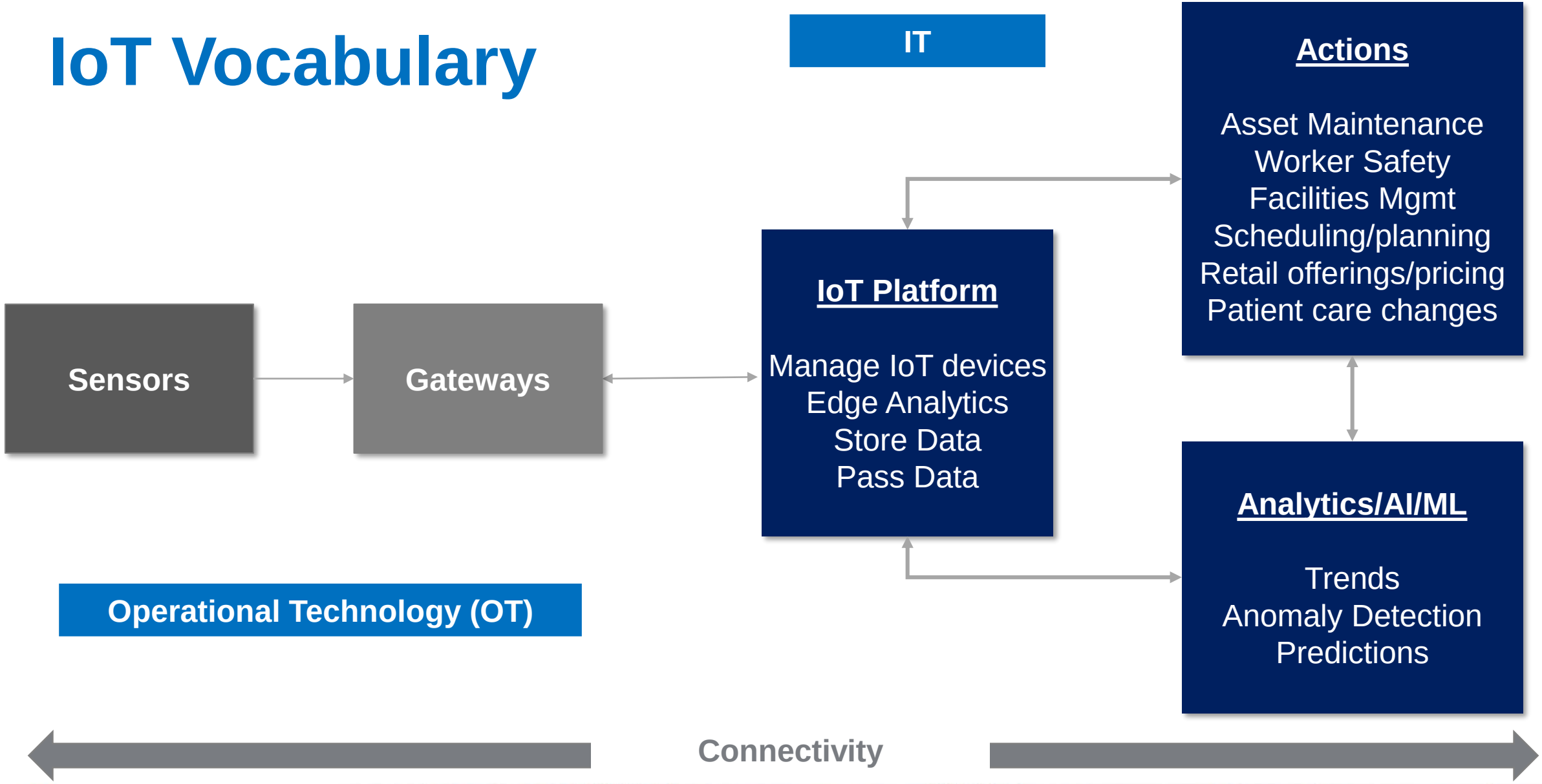
Transportation

- Reduce operational costs
- Increase revenue by improving customer experience

What Can IoT Tell You?



IoT Vocabulary



End-to-End IoT Solution

Security

External Sensors and Gateway

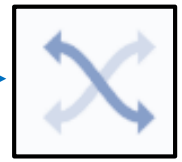
Embedded Sensors and Gateway

IoT Gateway

Sensor data collection
Edge analytics

OT

Connectivity



Data storage

Device management
Data routing
Edge analytics

- Notification Applications
- Analytics
- Dashboards
- Service Management
- Mobile/Web Applications
- Workforce management

IT

Connected Assets/IoT Common Use Cases

Cities

- Predictive Maintenance
- Smart Buildings
- Lighting
- Public Safety

Industry

- Predictive Maintenance
- Condition Monitoring
- Robotics
- Asset tracking
- Worker Safety
- Logistics
- Industrial Networking

Retail

- Digital Signage
- Cold Chain
- Digital Shelf Labels
- Store Traffic Analytics
- Inventory
- Business Continuity

Environmental

- Air Quality
- Water Management
- Weather
- Remote Monitoring
- Energy Grid

Medical

- Medical Devices
- Remote Healthcare
- Supply Chain

Agriculture

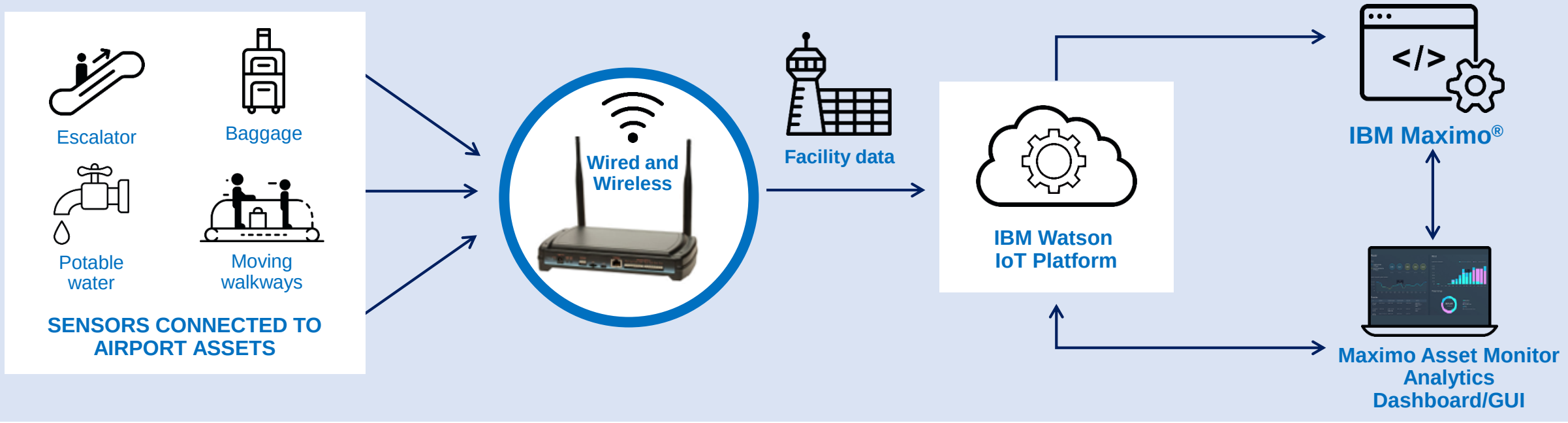
- Autonomous Farming
- Irrigation
- Livestock
- Microclimate

Transportation

- Logistics
- Asset Tracking
- Rail
- Aerospace
- Heavy Equipment
- Off road

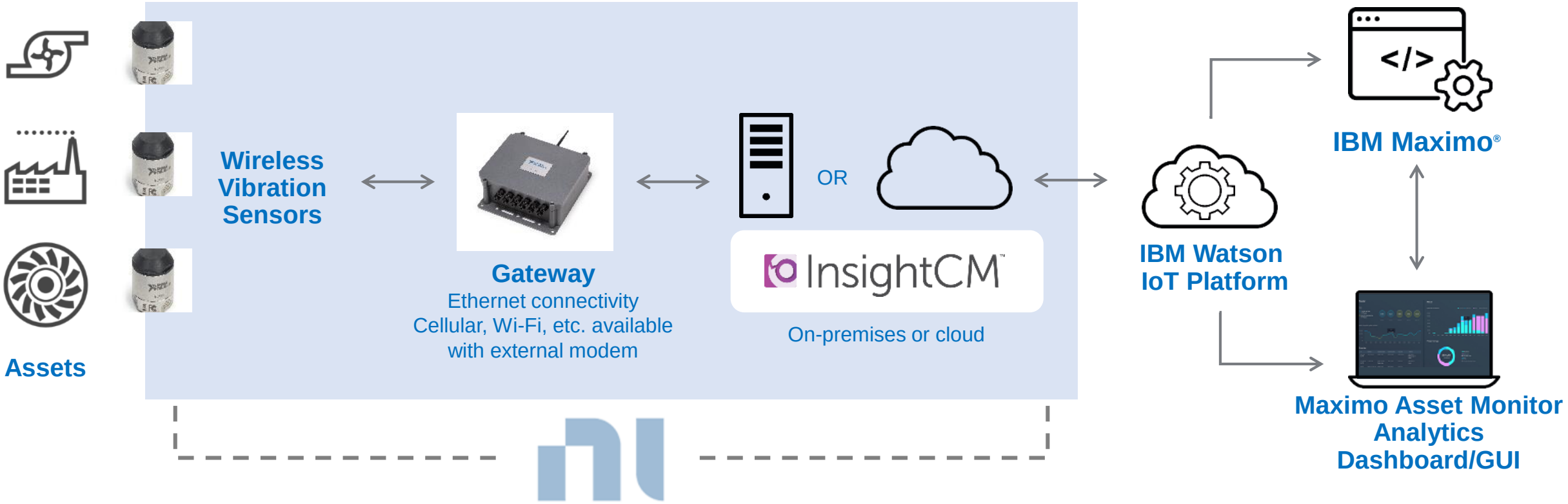
Smart Airport Asset Management Solution

Condition Monitoring and Predictive Maintenance

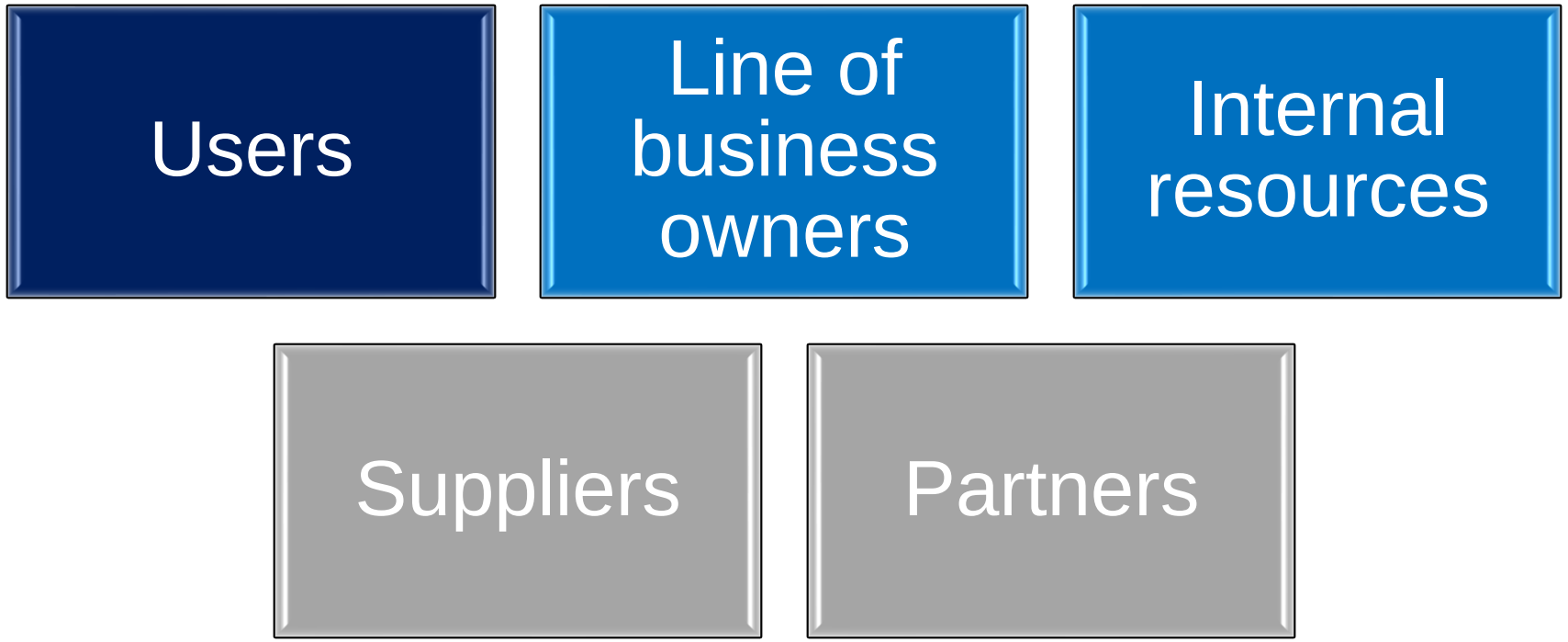


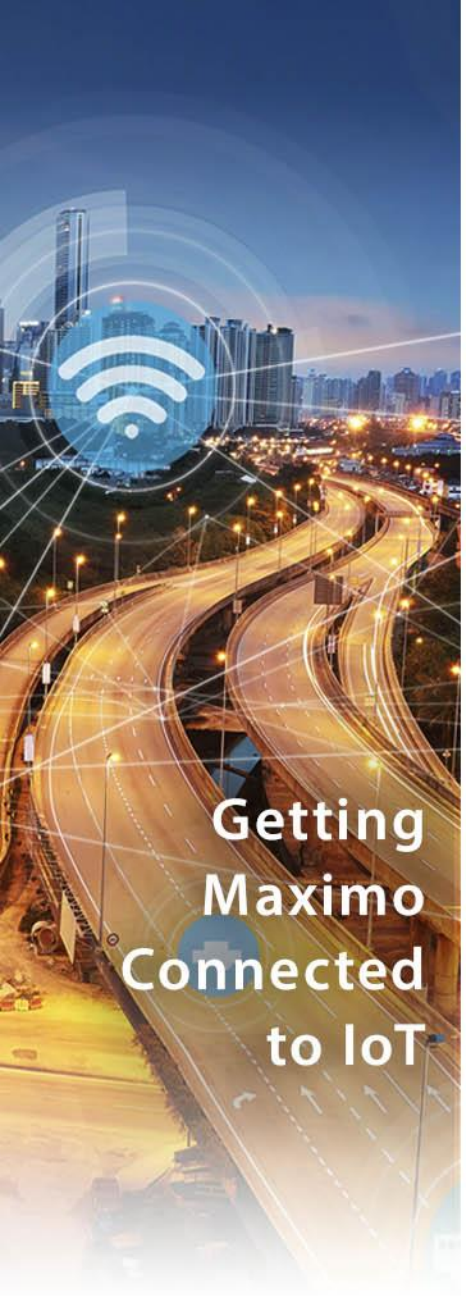
Wireless Industrial Asset Insight

Condition Monitoring and Predictive Maintenance



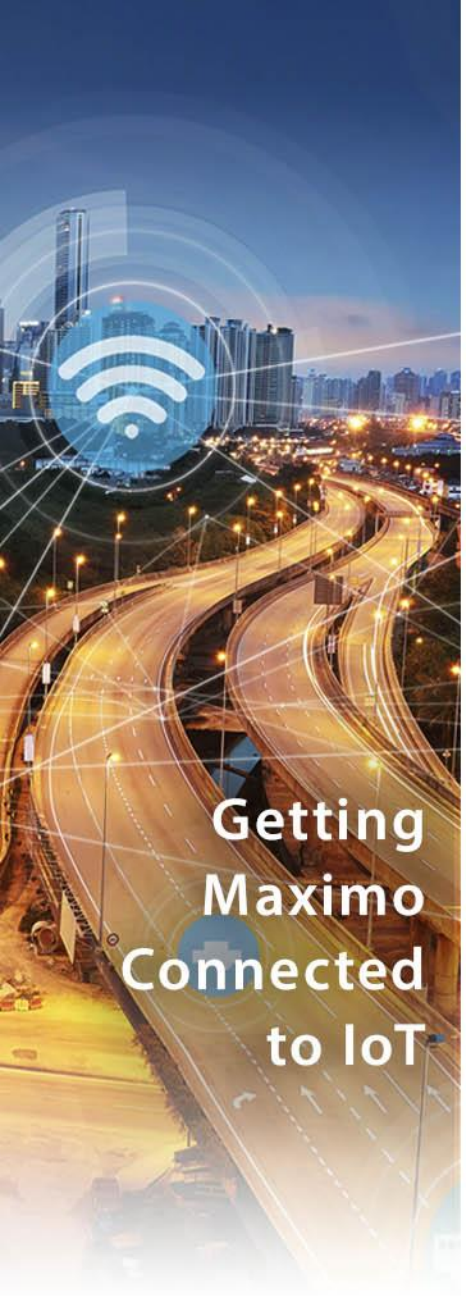
IoT Requires Ecosystems





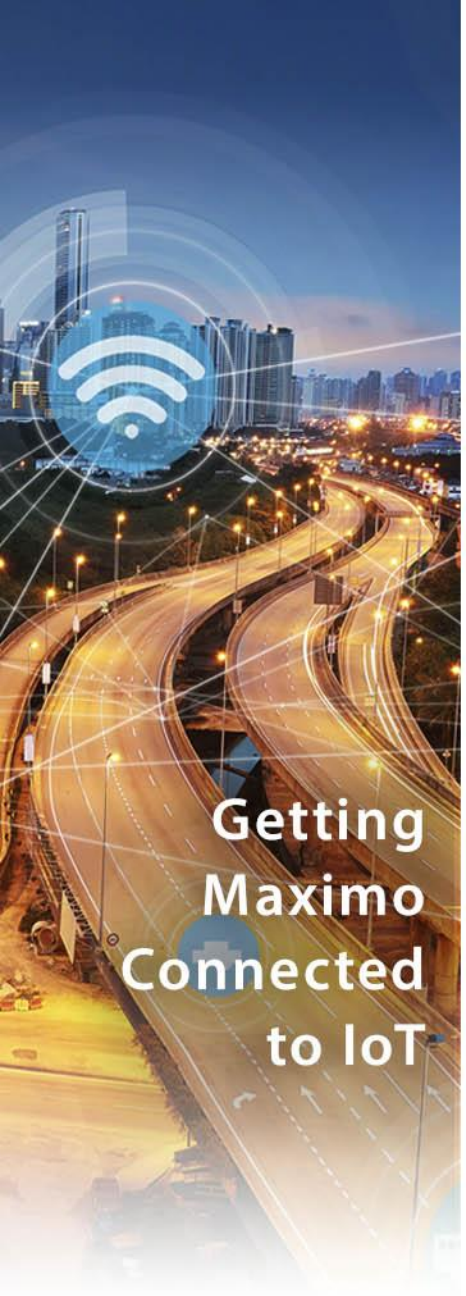
Building the Business Case for a Proof of Concept

So, How Do You Embark on Building an IoT Program That Will Make a Difference?



Building the Business Case for a Proof of Concept

- **Start Small, But With a Future State in Mind**
- **Do a Proof of Concept With Deliverables Beyond just the Technology Solution**
  - Early Win That Builds Momentum
  - Document the Project Methodology so the Success is Repeatable
  - Test the IT Infrastructure so the Success is Scalable



Building the Business Case for a Proof of Concept

- **Benefits of This Approach:**
  - Smaller Initial Investment with Direct ROI
  - Smaller Barrier to Entry on Next Project
  - Increased Momentum Towards Next Project

Selecting the Use Case

ID Organizational Challenges

Who:

- Executive Sponsors
- Project Team
- Cross-Functional Representatives

What:

- Brainstorm Any and All Challenges:
  - Customer/employee Experience
  - Operations
  - Facilities Management
  - Financial

How:

- Whiteboard Session
- Organize Issues into Categories

Prioritize

Who:

- Executive Sponsors
- Project Team
- Cross-Functional Representatives

What:

- Establish Initial Objective Prioritization of Issues

How:

- Score Each for Severity
- Score Each for Frequency
- Score Each for Detectability
- Compile Scores and Rank

The top two tiers of the stack-ranked results of the discussion are provided below:

Issue/Opportunity	Severity	Frequency	Detectability	Combined
Baggage - Bag Hygiene Failures	3	3	3	9
Gate Amenities - Potable Water Issues	3	3	3	9
HVAC - Air Handlers - Condensate Flooding/Leaks	3	3	3	9
HVAC - Filter Change Out Process Optimization	3	3	3	9
Mechanical - Conveyor Rotary Motors - Failures / Power Draw Detection	3	3	3	9
Other - Comfort At Gates - power at powered seats	3	3	3	9
Other - Trash Compactors	3	3	3	9
Restrooms - Cleanliness	3	3	3	9
Restrooms - Equipment Issues/Leaks/Floods	3	3	3	9
Baggage - Mechanical Failures	3	2	3	8
Chilled Water - Distribution Issues	3	2	3	8
Electrical - Lighting Level Issues In Specific Areas Related to Safety)	3	2	3	8
Gate Amenities - 400 hz system - Cable Issues	3	3	2	8
Gate Amenities - HVAC - PC Air Issues	3	2	3	8
HVAC - Comm Rooms - High Temp Alarms	3	2	3	8
HVAC - VFD Condition	3	2	3	8
Other - "Waterfront" Boiler Alarms	3	2	3	8
Other - Various Manual Alarms (i.e. Lift Stations)	2	3	3	8
Wastewater - Biffy Dumps / Lift Stations - Failure	3	2	3	8
Water - Chlorine Level Monitoring	3	3	2	8

Vote and Discuss

Who:

- Executive Sponsors
- Project Team
- Cross-Functional Representatives

What:

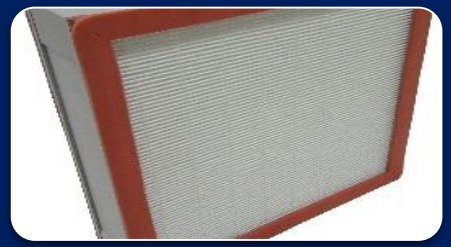
- Add Subjective Judgement to The Prioritization and Try to Build Consensus

How:

- Individuals Vote for Their Top Three
- Individuals Verbalize Justification for Their Vote
- Group Discusses Vote Results and Justifications

Critical Asset Monitoring IoT - Opportunities	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6	Participant 7	Participant 8	TOTAL
HVAC - Filter Change Out Process Optimization		1	3	3	2	3	3	3	18
HVAC - VFD Condition / Vibration Analysis	2		1	2	3	2		2	12
Mechanical - Conveyor Rotary Motors - Failures / Power Draw Detection			2		1		2	1	6
Baggage - Bag Hygiene Failures	3						1		4
Restrooms - Cleanliness		3							3
HVAC - Air Handlers - Condensate Flooding/Leaks	1			1					2
Restrooms - Equipment Issues/Leaks/Floods		?							?
Water - Chlorine Level Monitoring						1			1

Real World Example Use Case



Optimize Filter Inspection and Replacement

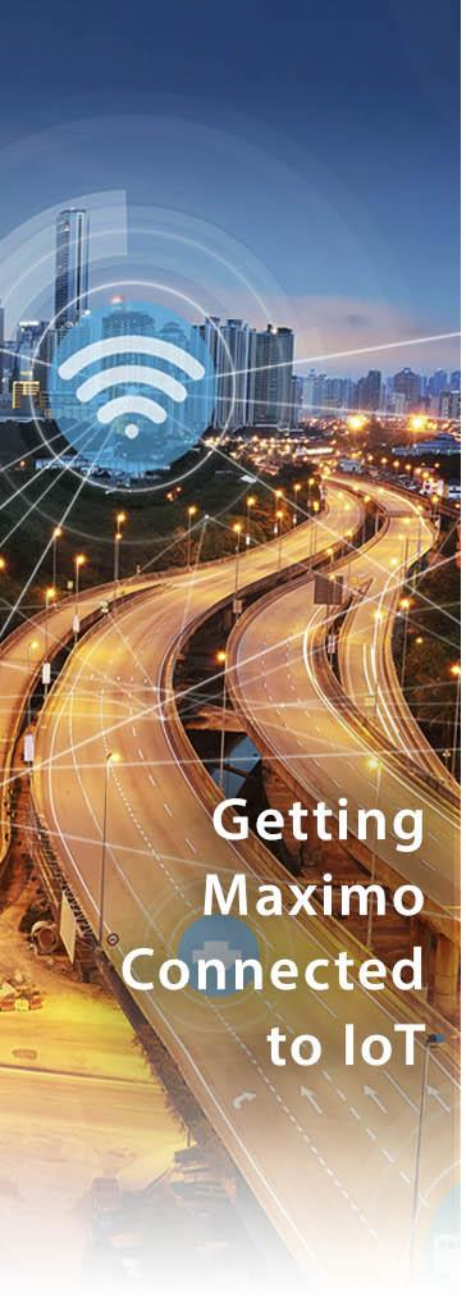
- **How**: Monitoring Differential Pressure Automatically (vs. Manually)
- **Why**: To Automatically Detect and Prioritize When Filters Should be Changed
- **Results**: Fewer Unnecessary Replacement, Fewer Overdue Replacements, Improved Efficiencies in Process

Monitor Fan Motor Conditions

- **How**: Monitoring Temp, Vibration and Current Related to Motors
- **Why**: To Automatically Detect Motor Health and Predict Motor Failure to Drive Maintenance Response
- **Results**: Fewer Equipment Failures, Fewer Unnecessary Maintenance Activities, Prescriptive Maintenance Recommendations

Monitor Condensate Levels in Drainage Pans

- **How**: Monitor for Fluid Level in Drainage Pan
- **Why**: To Automatically Detect Blockage Condition and Respond Prior to Leakage or Flooding
- **Results**: Fewer Leaks or Flood Events



Selection of Use Case Notes

- **Voting and Discussing Often Results in Consensus on the Type of Asset to Target**
- **Both the Prioritization Scoring and Subjective Factors Introduced in the Discussion is What Drives the Consensus**
- **If It Doesn't Happen This Way for You, an Additional "Final" Vote Could be Utilized**
- **For SeaTac:**
  - All Agreed HVAC Was Critical To Customer Experience
  - All Agreed HVAC Was Highly Visible With Stakeholders
  - All Agreed That There Were Obvious IoT Use Cases

Planning the Proof of Concept

Planning

- ID Use Case
- Define Success Criteria
- Define Scope
- Review As-Is Processes

Design

- Define To-Be Processes
- System Requirements
- Technical Design
- Implementation Plan

Edge Sensors

12+ YEAR BATTERY LIFE (ON TWO AAA)

1

Differential Pressure

2

Tri-axis Accelerometer

Temperature Probe

Electrical Current Monitor

3

Water Detection

1,200+ FOOT RANGE (THROUGH WALLS)

BANK LEVEL AES SECURITY

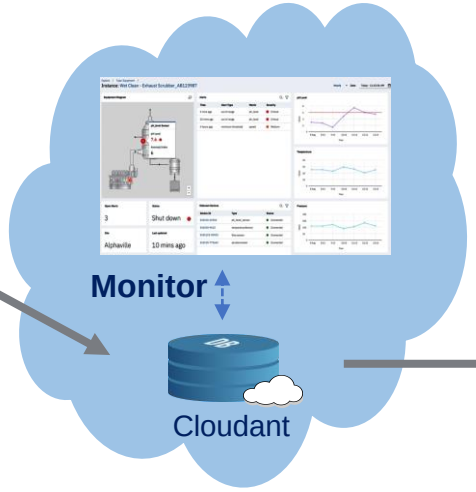
Gateway(s)

Gateways convert the encrypted 900MHz sensor data to cellular for transmission to IBM/Maximo

Cellular Network

IBM Monitor

(Watson IoT Platform)



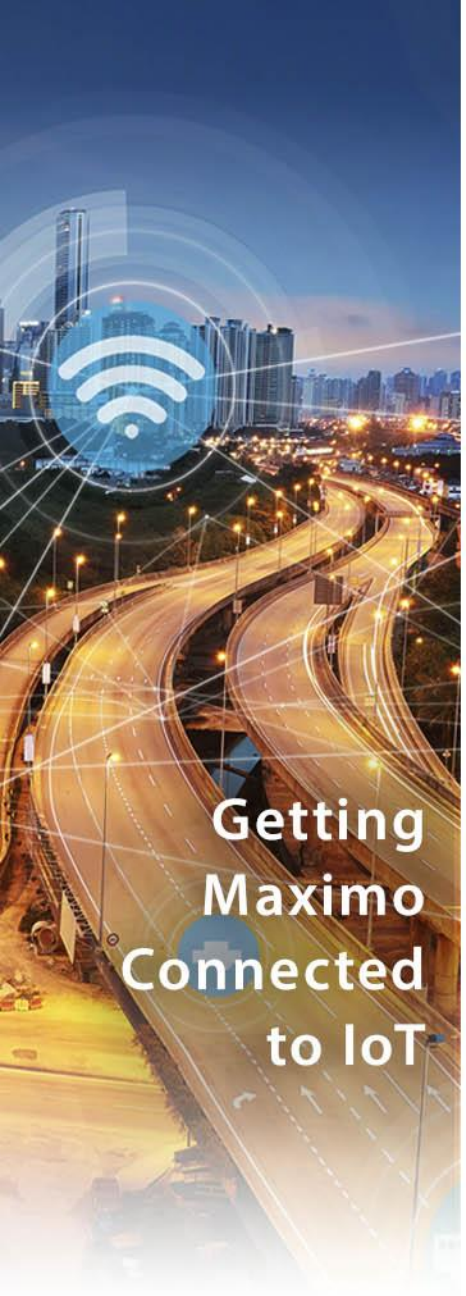
SeaTac Maximo Environment

AHI User Interface

IBM maximo
Asset Health Insights (AHI)

Each of the **3** use-cases are addressed with the sensors outlined here. These can be replicated across multiple assets.

Overview of Technical Design



Technical Design Considerations

- Retro-fitting Sensors – No Connection to Control Systems
- Right Sensors for the Job – Durable, Easy to Install, Good Bang for Buck, More Than Sufficient Precision and Accuracy
- Cellular Communication to Cloud – Avoid Network Security Issues
- Leveraging Maximo Asset Performance Management Solutions – Leverage Maximo Footprint, Leverage Watson AI, Ease of Integration/Configuration

IBM Maximo Asset Monitor

Monitoring at Enterprise-Scale

Solution

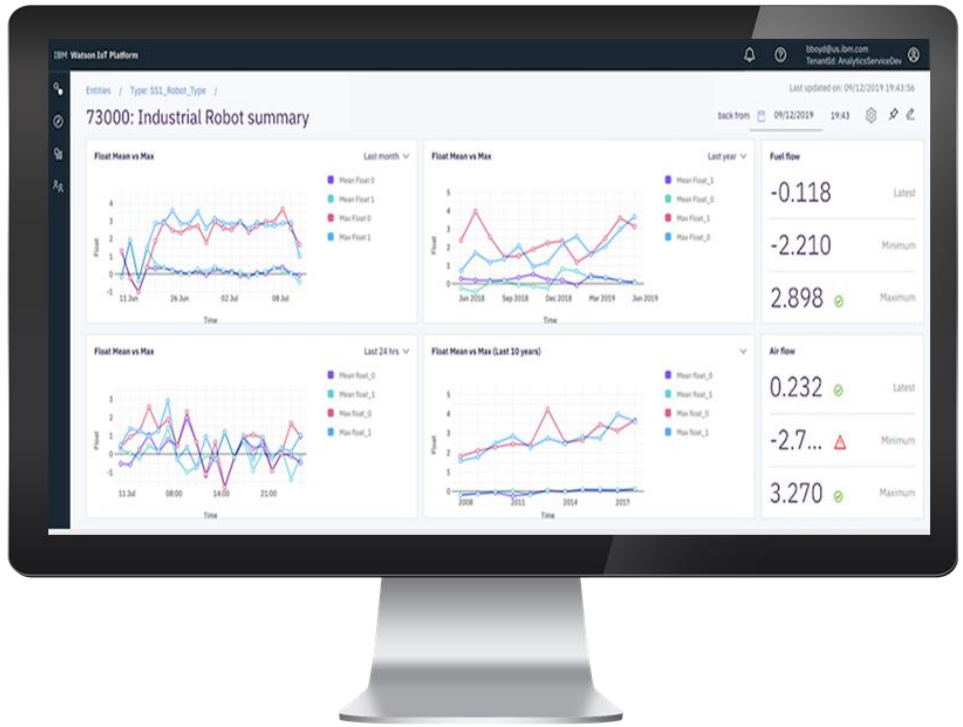
- Consolidated global view of processes
- Data visibility and analysis
- AI-based anomalies
- Enterprise scale monitoring

Capabilities

- Configurable dashboards & drill down
- Enterprise wide view of operation
- Workflow to drive ownership of issues
- Auto-generation of work orders
- Rapid data integration
- Hierarchical data filtering and management

Benefits

- Reduce unplanned downtime the duration of the outages
- Increase production output
- Avoid regulatory fines
- Decrease unneeded labor investigating false-positive alerts



IBM Maximo APM - Health

IBM Maximo APM – Asset Health Insights

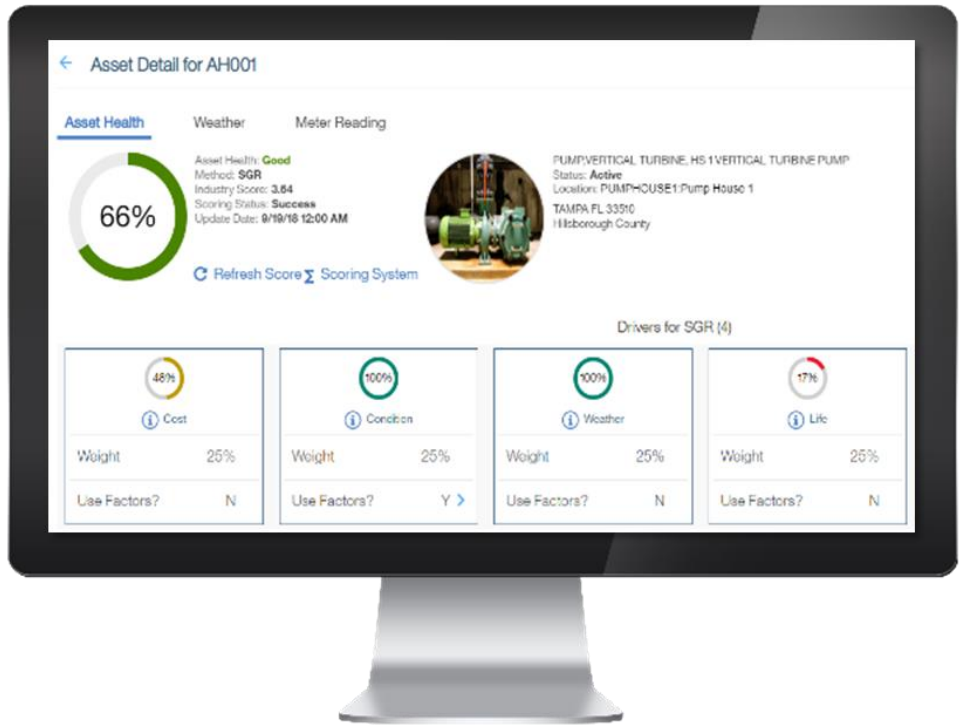
Enables reliability engineers and maintenance supervisors to gain a deeper understanding of the health of their assets. Provides capabilities to model, map, monitor, and optimize the health of assets.

Solution

- Consolidated global view of assets
- Health Visibility and Analysis
- Condition based actions
- Replacement Planning
- Integration to Predict module

Capabilities

- Dashboard with cards, map view, spreadsheet view
- Fleet-wide view and health drilldown
- Health based notifications and actions
- Flexible health scoring by asset type or groups
- Sensor data integration
- Job plan efficacy analysis
- Refurbish / replace prioritization



IBM Maximo APM - Predict

IBM Maximo APM – Predictive Maintenance Insights

Solution

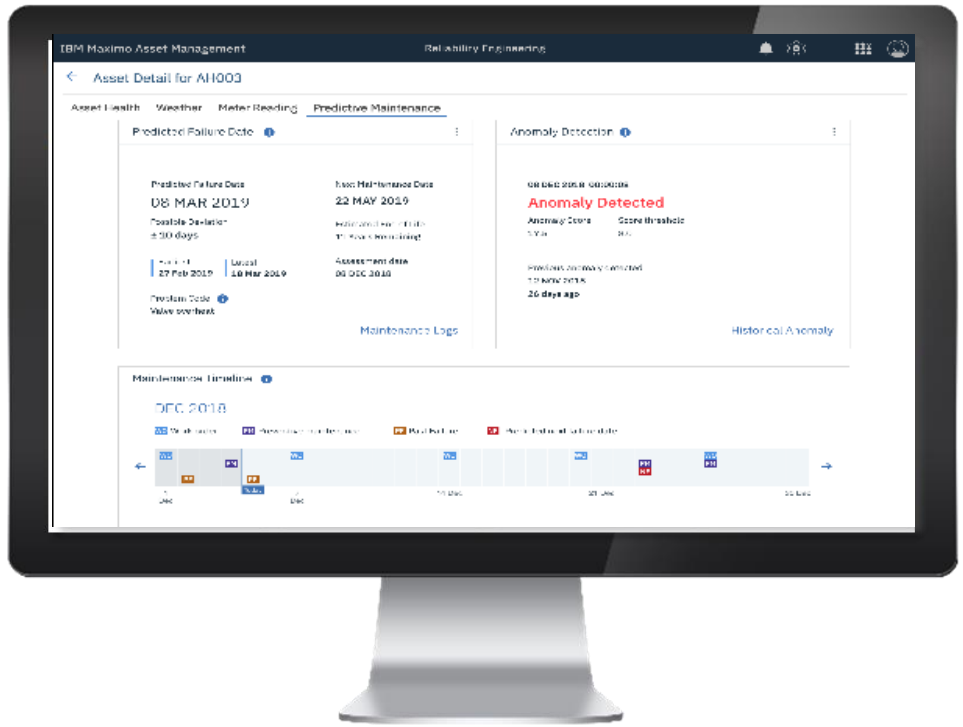
- Build asset failure models
- Predict failures
- Determine factors that contribute to failure
- Score models with current sensor data

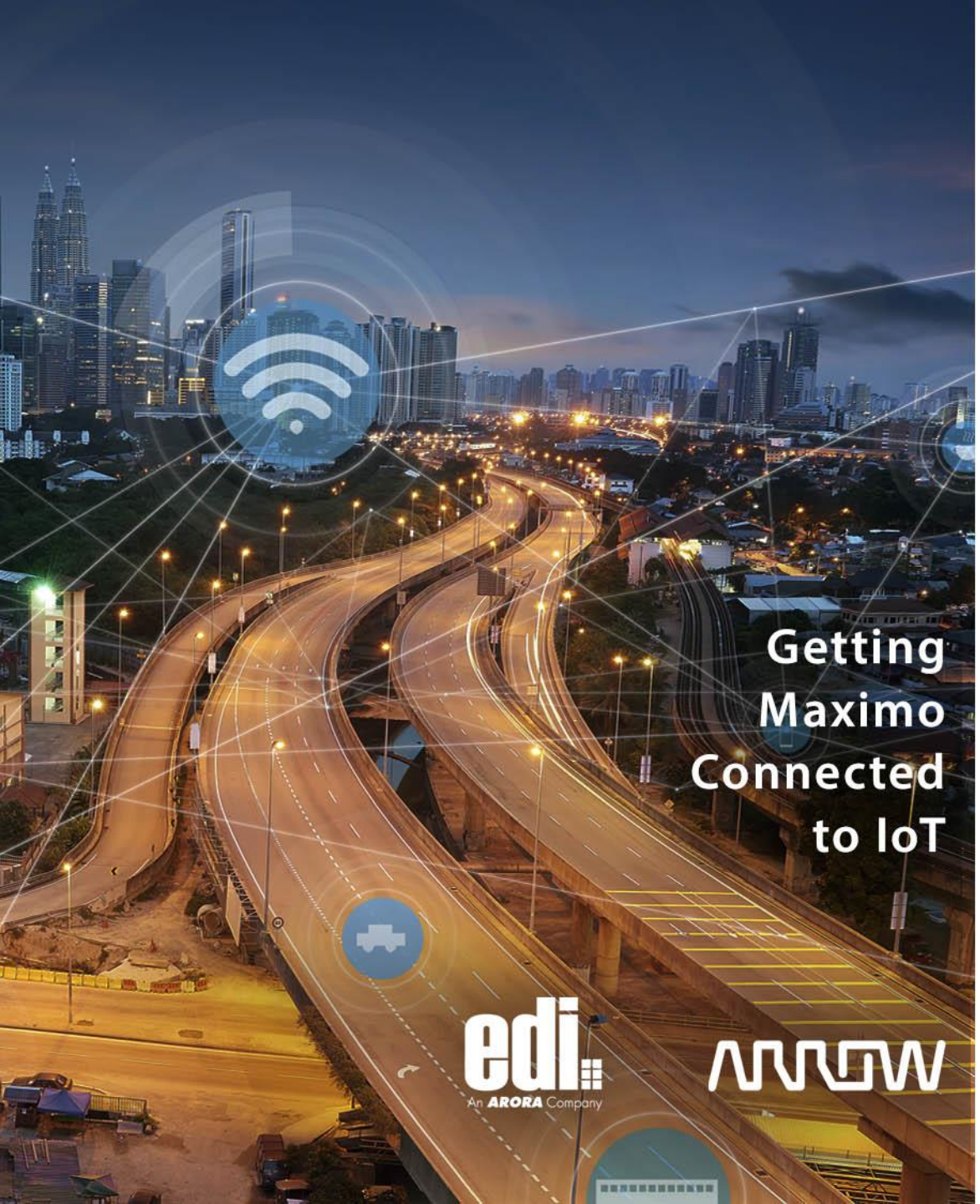
Capabilities

- Score predictive models using Watson ML
- View pre-built visualizations for the 5 common models
- Use model scores to asses asset health with Maximo Monitor

Benefits

- Reduced failures
- Reduced maintenance costs
- Improved asset utilization
- Extended life of asset
- Increased production output





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