Building a New Path to Supply Chain Operational Excellence

Optimized Operating Envelopes

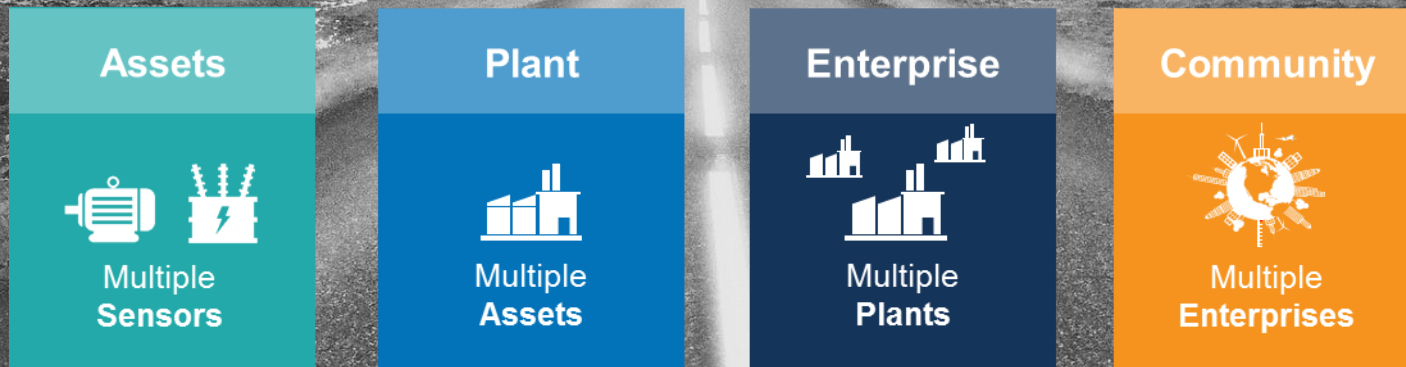Presented by Matthew Miller, Transportation Industry Principal

Topics

Benefits of the journey

Prospective Solutions using proven concepts

Opportunities for more predictable outcomes

Challenges in digitizing the supply chain

Our Vision: Industrial Digital Transformation

Assets — Multiple **Sensors**

Plant — Multiple **Assets**

Enterprise — Multiple **Plants**

Community — Multiple **Enterprises**

We believe People with Data can Transform their world

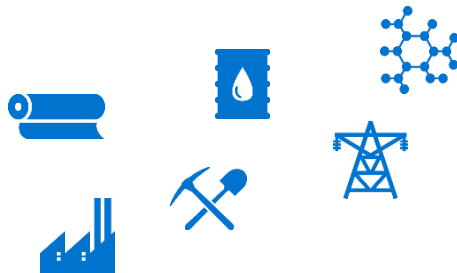# The Future of Transportation is…Intelligent!

Connected

Collaborative

All Driven by Real-time Data!

Sustainable

Automated

OSIsoft in Transportation

- Enterprises

- Transportation & Logistics

- Data Sciences, Academia & Standards Groups

Digitization of Industry is Underway

% of US GDP

| Digital Leaders	Potential for Digital Transformation

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%
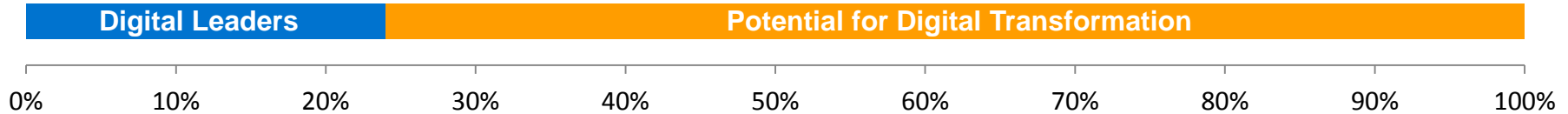
Relatively high digitization

- Information technology
- Media
- Professional services
- Finance & insurance

- Utilities
- Transportation
- Advanced manufacturing

Relatively low digitization

- Agriculture
- Mining
- Basic goods manufacturing

- Chemicals
- Oil & gas
- Wholesale trade
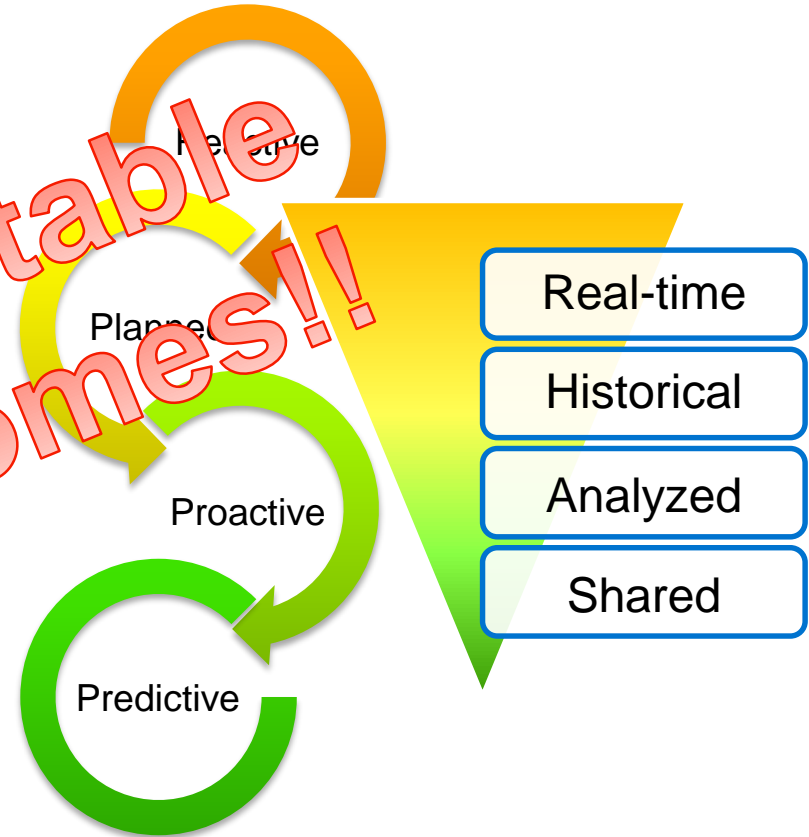
Source: McKinsey, "MGI Digital America" December 2015
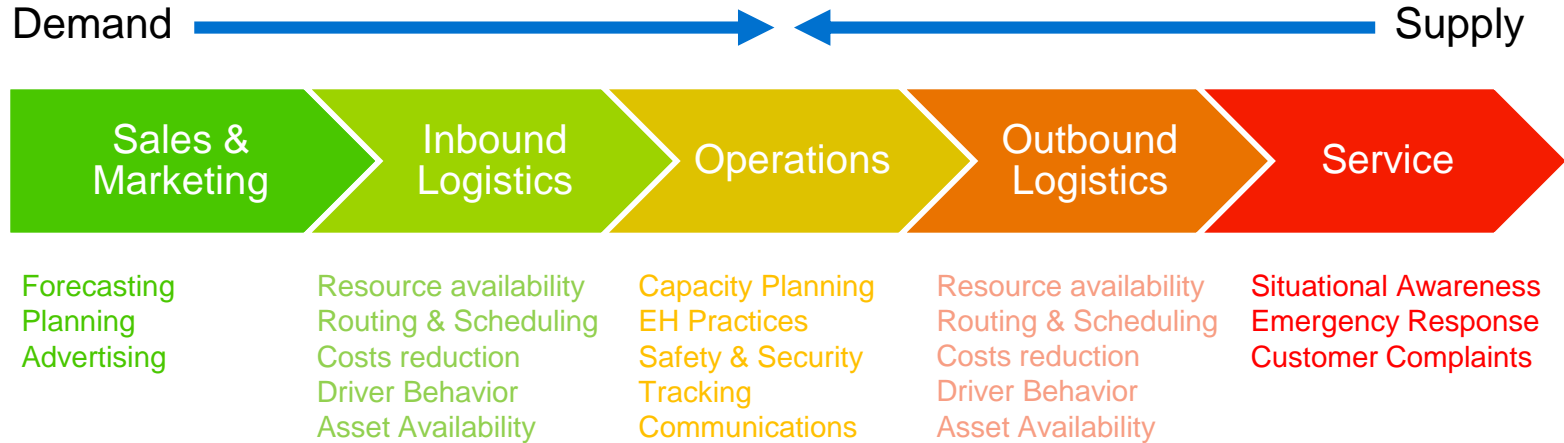
Transportation Challenges – Balancing ROI & Risk
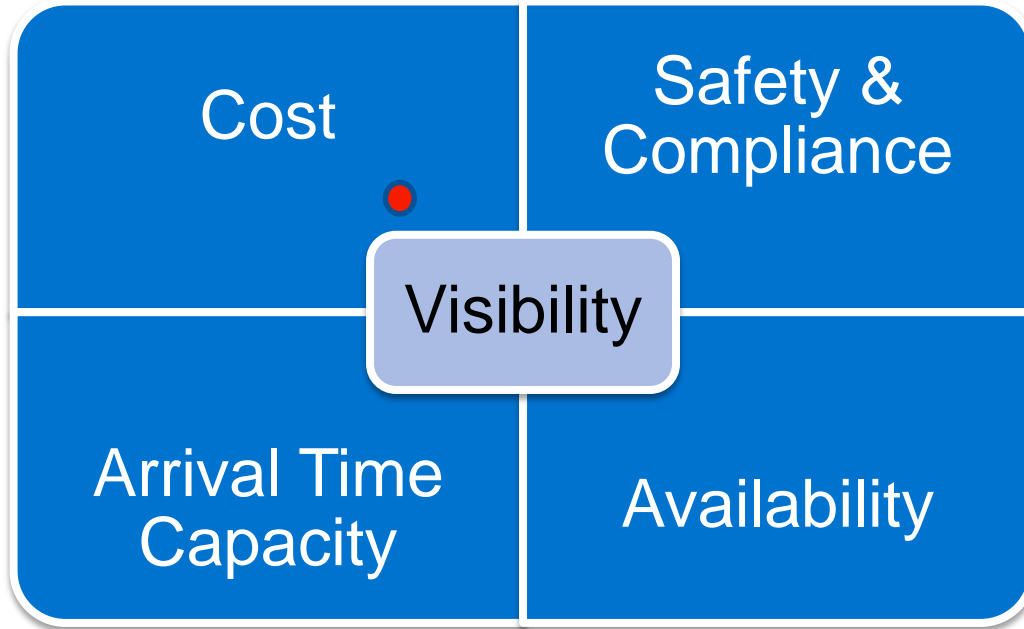
Data-Driven Real-time Operational Excellence

✓ Asset Management
✓ Network Capacity
✓ Energy Management
✓ Safety & Security
✓ Regulatory Compliance
✓ On-time performance

Predictable Outcomes!!

Reactive

Planned

Proactive

Predictive

Real-time

Historical

Analyzed

Shared

Challenges for Transportation

Demand ➡️ ⬅️ Supply

Sales & Marketing	Inbound Logistics	Operations	Outbound Logistics	Service

Sales & Marketing
- Forecasting
- Planning
- Advertising

Inbound Logistics
- Resource availability
- Routing & Scheduling
- Costs reduction
- Driver Behavior
- Asset Availability

Operations
- Capacity Planning
- EH Practices
- Safety & Security
- Tracking
- Communications

Outbound Logistics
- Resource availability
- Routing & Scheduling
- Costs reduction
- Driver Behavior
- Asset Availability

Service
- Situational Awareness
- Emergency Response
- Customer Complaints

Nissan Leaf "Innovationathon"

Optimized Operational Envelopes
Batch revisited… what is a batch?

Master Recipe- BOM + Instructions
Current Recipe – adapted for optimized outcome

Mix Wet Ingredients

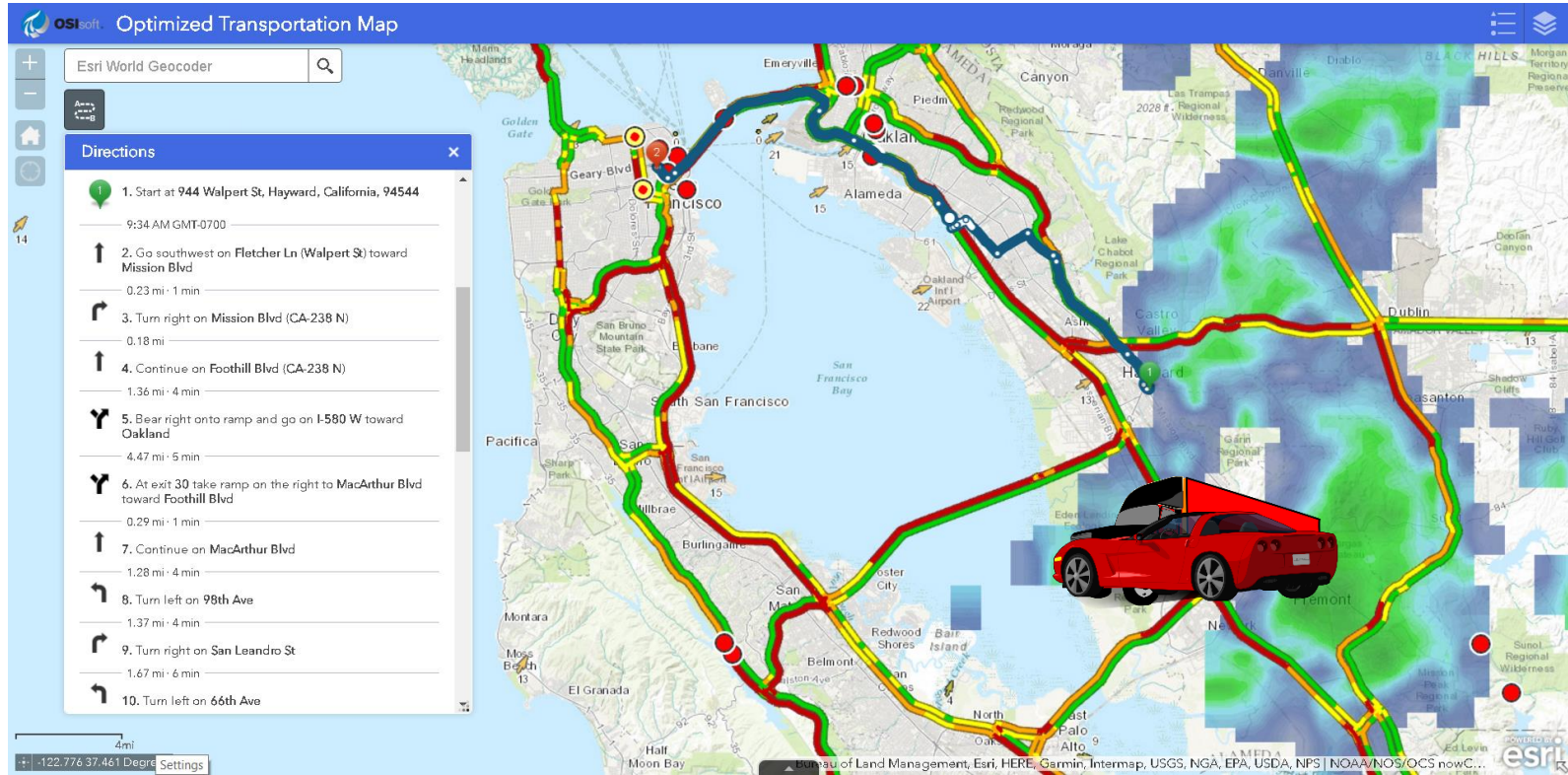Sift Flour

Mix

First Rising

Knead

Second Rising

Recovery Action!

Burner Failure

Bake

Cool

QC

Package

Ship

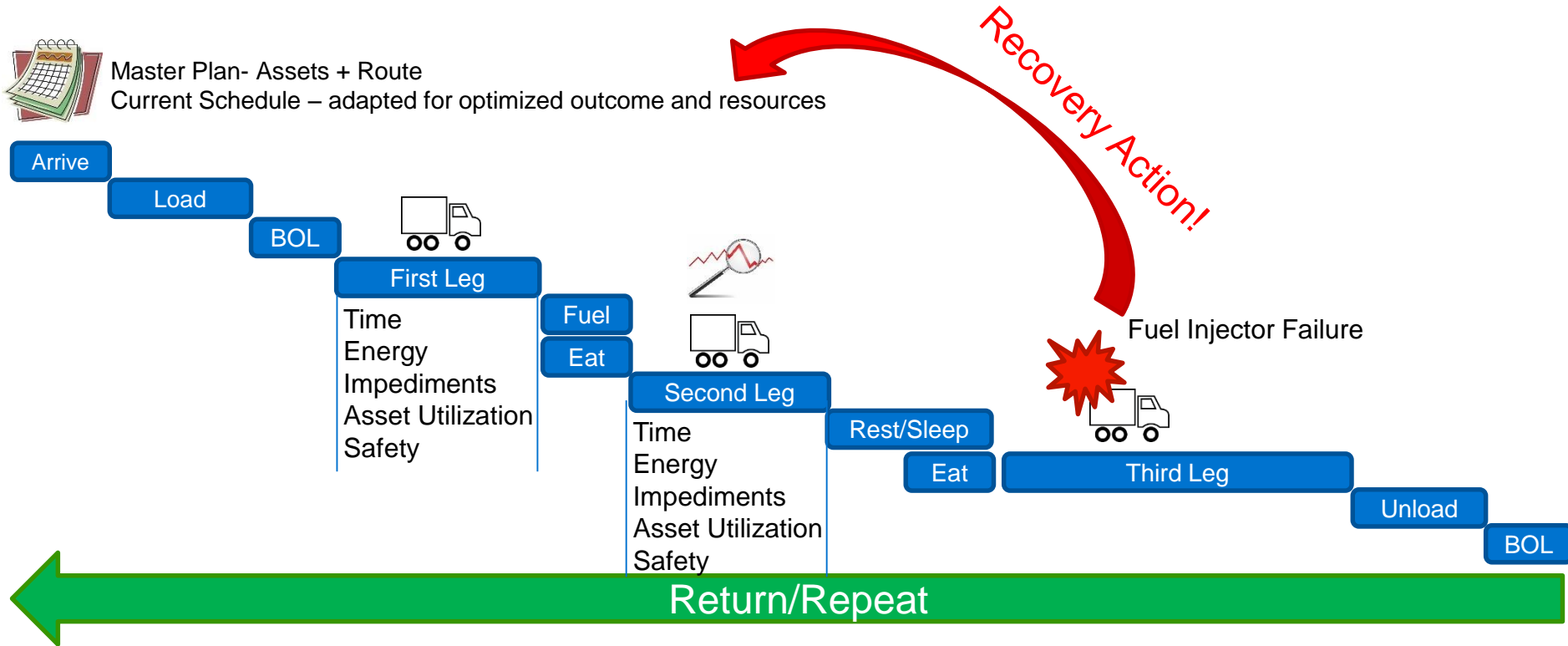Rinse & Repeat

What is the State of Transportation Today?

Repeatable Trips

Master Plan- Assets + Route
Current Schedule – adapted for optimized outcome and resources

Recovery Action!

Arrive

Load

BOL

First Leg

Fuel

Eat

Time
Energy
Impediments
Asset Utilization
Safety

Second Leg

Time
Energy
Impediments
Asset Utilization
Safety

Rest/Sleep

Eat

Fuel Injector Failure

Third Leg

Unload

BOL

Return/Repeat

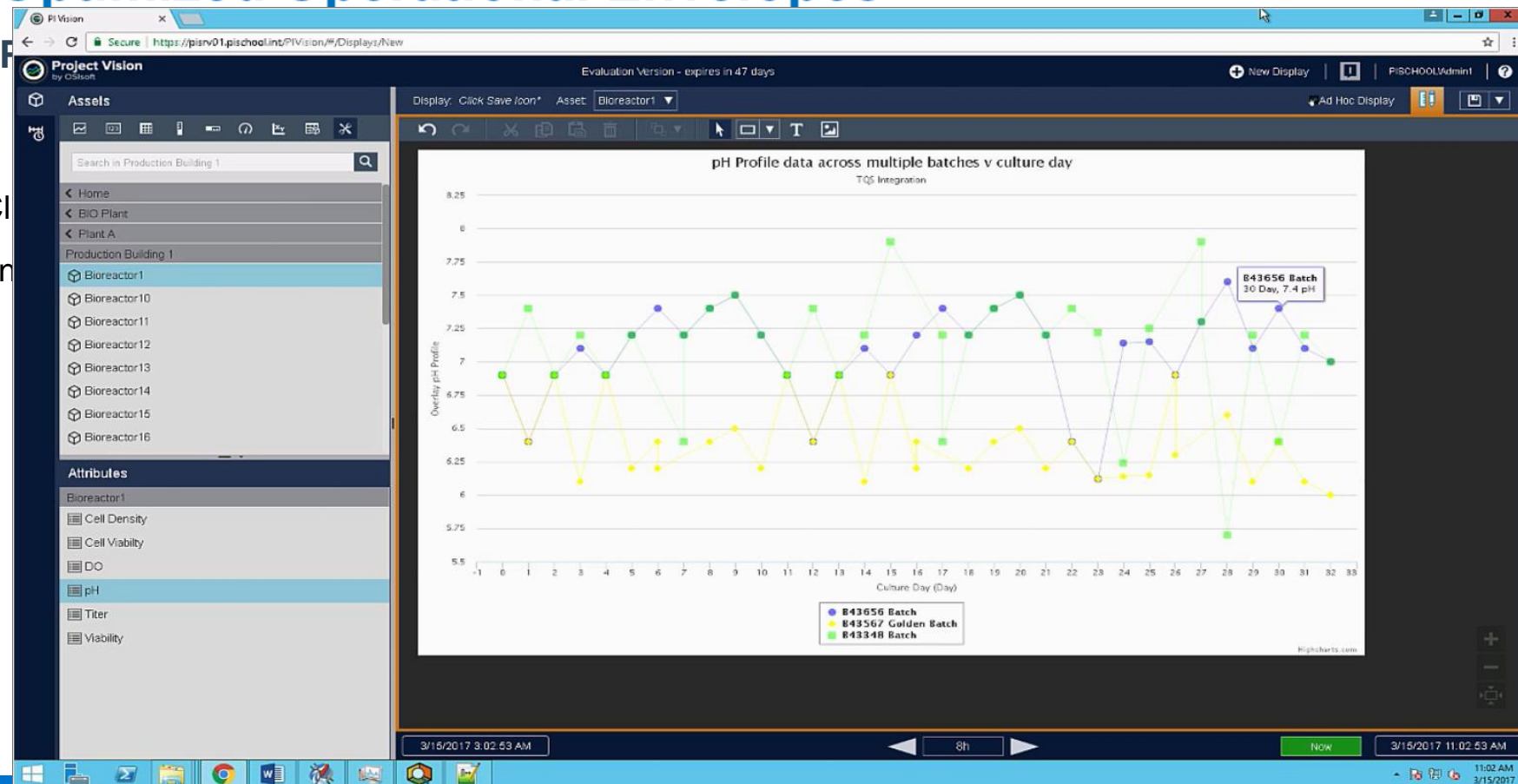# Optimized Operational Envelopes…OOE
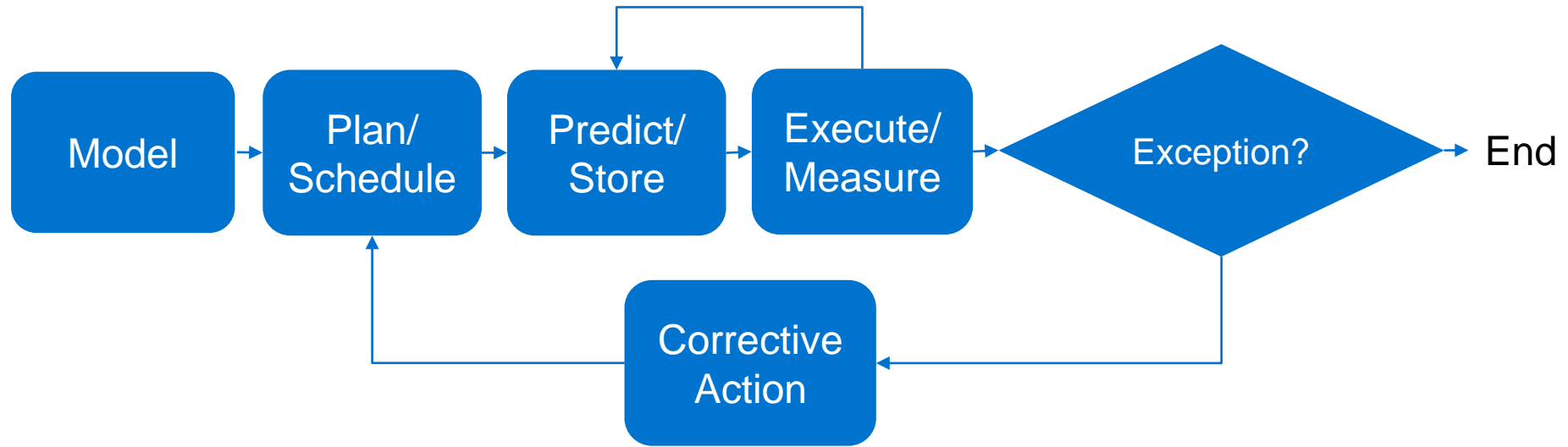
Optimized Operational Envelopes

## Concept of Batch Optimization
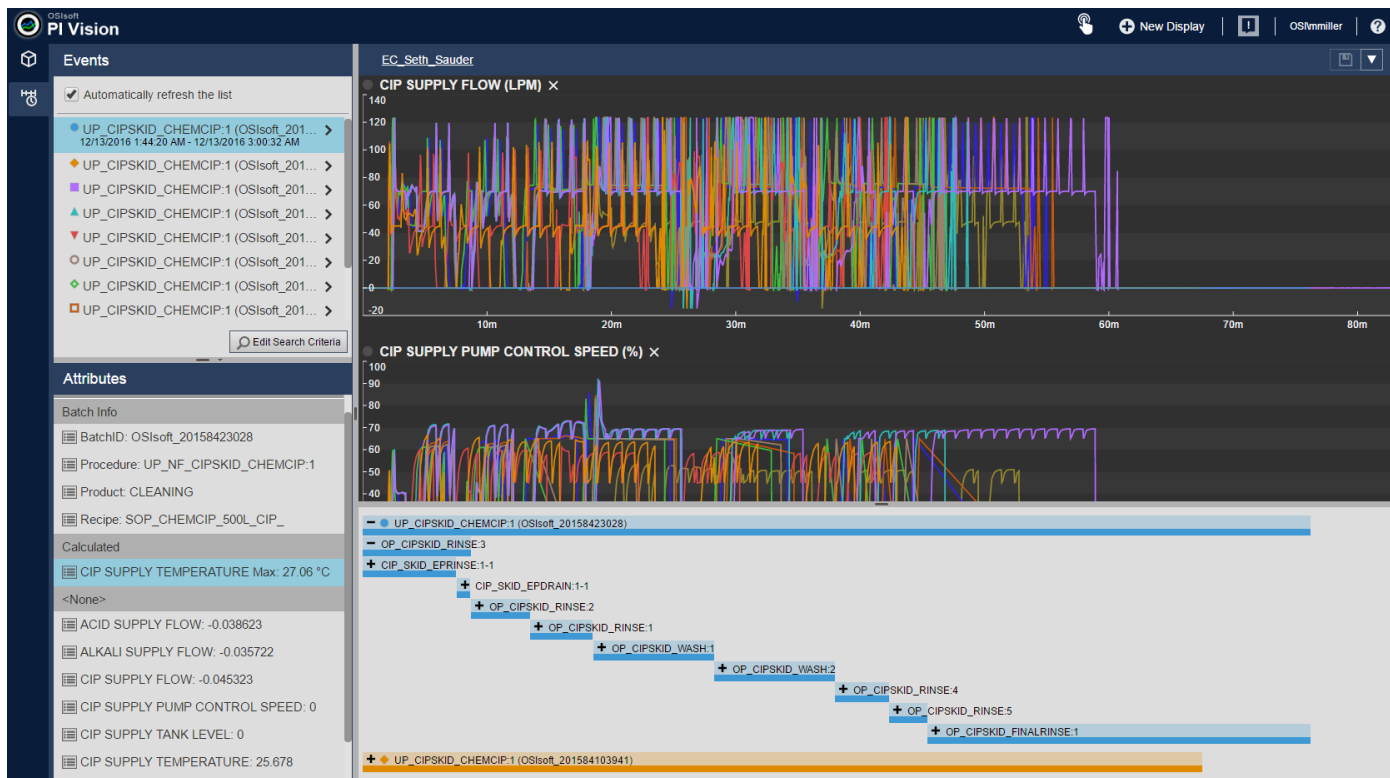
Optimized Operational Envelopes

Predictive Analytics

- Understand historical patterns
- Model environmental impacts (traffic, weather construction, impediments etc.)
- Event correlations – parameters, calc's & metrics
- Provide target operation conditions to match goals
- Store predictions to operate and refine the model
- Automatically re-execute plan on exceptions

Real-time

Historical

Analyzed

Shared
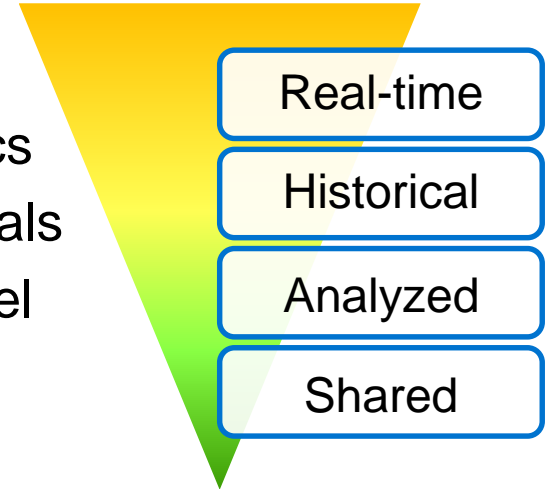
# Sustainable Multi-Modal Goods Movement

Each link in the value chain:

– Is a connection point

– Is an opportunity to operate more sustainably

– Is an opportunity for efficiency improvements
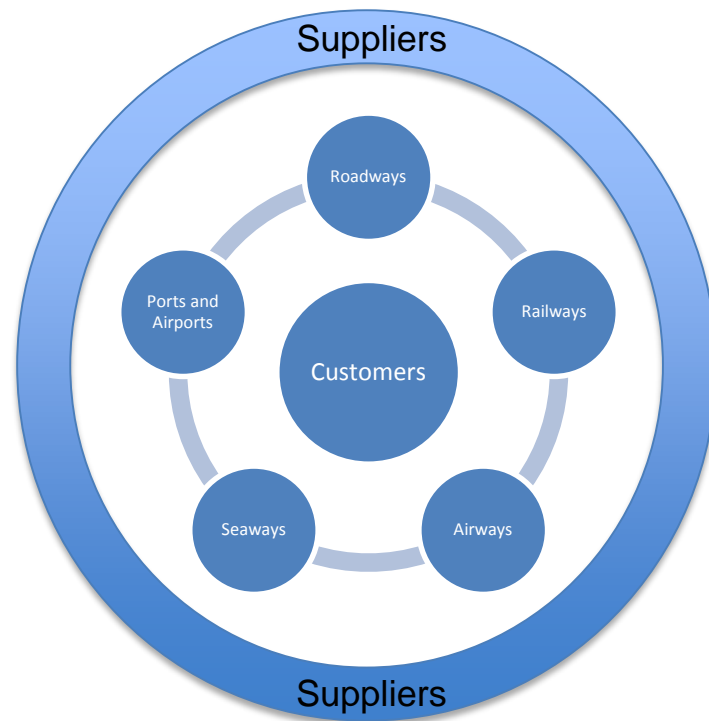
Impact to Collaborative Ecosystems

- On-time arrivals
- Shorten lead-times
- Resiliency
- Reduce Waste/Cost
- Lower risk

Real-time Collaboration

Real-time Collaboration

Real-time Collaboration

Supply Chain
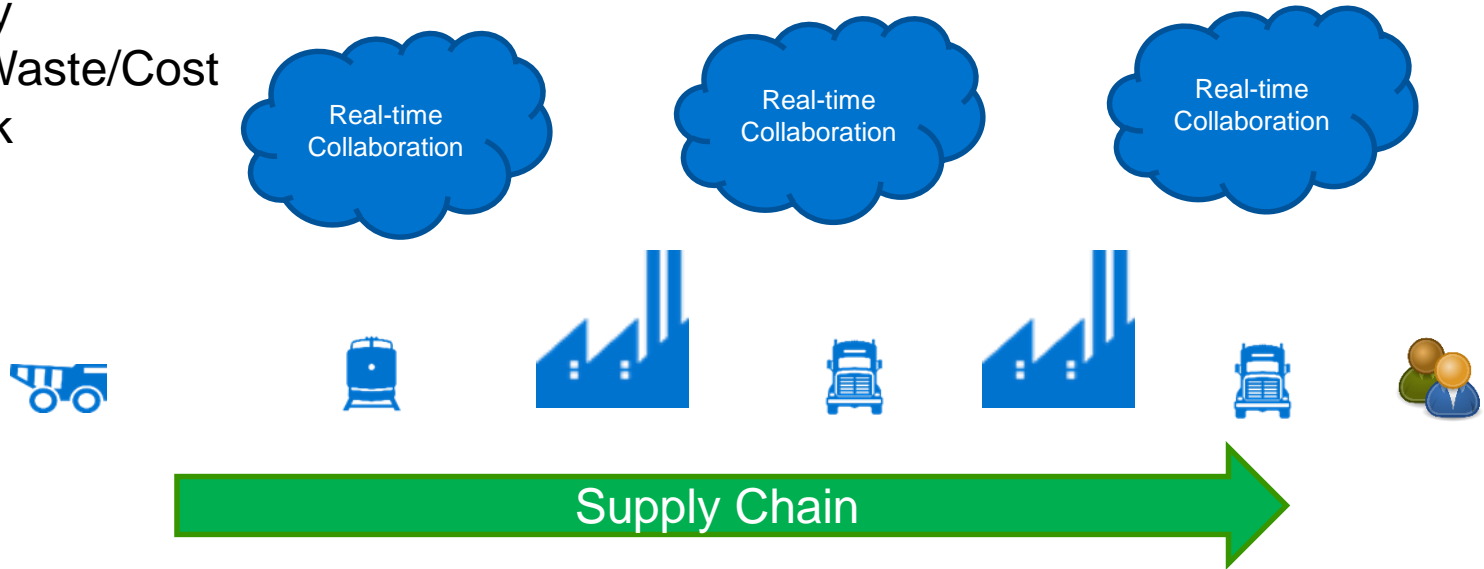
Heavy-Haul Equipment Logistic Strategies Using the PI System

COMPANY and GOAL

ArcelorMittal is Mines Canada on Quebec's North Shore - The world's number one steelmaker hauls and ships over 26 million metric tons of iron ore products every year for the international steel market WANTS to

Transform its mining business with supply chain resilience.

CHALLENGE

Increase speed and quality of logistic decisions to support an increase of 10+ Mt of throughput following expansion.

- Reduction in variable production costs;
- Increase visibility of entire supply chain;
- Resilience in adapting to disruptions and plan changes

SOLUTION

Use the PI System as an Information Hub to "Contextualize" data and manage all aspects of the supply chain.

- Transform data into actionable information;
- Support KPI-based planning to drive business goals;
- Assist in scheduling maintenance at the right time based on market requirements

RESULTS

Throughput targets of 26Mt were met as shipping capacity increased with no infrastructure investments

- Visibility on all strategic, tactical and operational planning challenges;
- Increased production and ore shipments from 23 to 26 Mt with additional revenue of 120M$ in 2015

New Path to Supply Chain Operational Excellence

Meet the challenges of digitalization
- ✓Consistent asset integration across the enterprise
- ✓Common system of record for all operations to drive improvement
- ✓Enable advanced analytics – prescriptive & predictive

Consider Optimized Operational Envelopes
- ✓ Repeatable route segments using many assets
- ✓ Better understanding of activities and best practices
- ✓ Optimization tuning dependent on current goals (on-time, fuel, safety, wear)
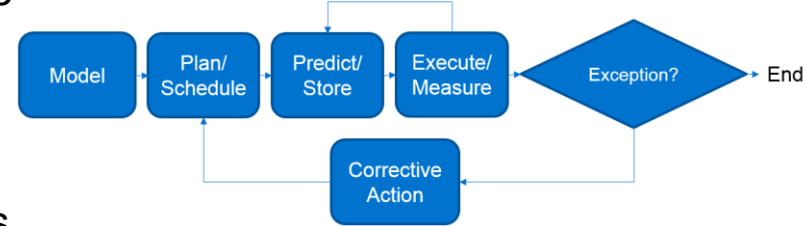
Collaborate in Real-time across your the supply chain for faster reaction times

Identify top risks to delivering expected outcomes and innovate!

Track Session Overview

Time	Customer/Partner	Speakers	Title
9:45 AM	Caterpillar	Rob Bradenham	Welcome to the Age of Smart Iron: How technology and innovation is driving change in the marine industry
10:45 AM	Devon Energy Seeq	Don Morrison Jon Peterson	Oil Field Tank Haul-off Improvement through integration of advanced analytics with the PI System
11:30 AM	Adani Ports ECGIT VCS	Yograjsinh Barad Limesh Misal Kamaldeep Singh	Port Performance and Profitability using the PI System, Esri and Analytics
2:15 PM	Barrick Gold	Alejandro Zappa	Mine Haul Truck Health Monitoring System
3:00 PM	Pertamina	Lennard Tambunan	PI System to Drive Refinery Oil Accounting
4:00 PM	Canada Steamship Lines/ BBA	Thierry Pennors Gael Cottet	(O2) – How to Manage our Operations to Ensure Maximum Efficiency and Full Compliance
4:45 PM	Blue Solutions Canada	Jean-Luc Monfort	PI System Application in EV Battery Manufacturing

Questions

Please wait for the **microphone** before asking your questions

State your **name & company**

Please remember to...

Complete the Online Survey for this session

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Transportation & Supply Chain Users Group

Networking Lunch Today

Inaugural Meeting 5:30-6:30 PM
Continental 7-9 (Here)

https://pisquare.osisoft.com/groups/transportation

Related Techcon Talks

Thursday March 23rd

Time	Title	Location
10:15 AM	PI Integrator for Esri ArcGIS	Imperial B (Hilton)
11:30 AM	Connectivity from A to Z-Roadmap for PI Connectors and PI Interfaces	Imperial B (Hilton)
2:15 PM or	Streaming Analytics, Data Lakes and PI Integrators Machine Learning 101	Imperial B (Hilton) Cyril Magnin III (Park)
3:00 PM or	Build a Secure, Public-Facing PI Web API Environment Batch and Event Frames	Cyril Magnin III (Park) Imperial B (Hilton)
4:30 PM	PI System Distributed Data Collection (IIoT)	Imperial B (Hilton)

OSIsoft Partners in Predictive Solutions

Contact Information

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감사합니다

谢谢

Danke

Gracias

Merci

Thank You

ありがとう

Спасибо

Obrigado

Optimized Operational Envelopes create predictable outcomes