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Building the Next-Gen Innovative High-Tech Supply Chain

Pradipa Karbhari

Director, Cloud and AI, Microsoft Corporation

Pradipa Karbhari- Speaker Introduction

- Current Role: Director, Cloud and AI, at Microsoft
- 20+ years industry and consulting experience leading global cross-functional teams
- Trusted Advisor and Thought Leader in Digital Transformation (spanning Business Strategy & Information Technology)
- Speaker at various international conferences

Industry Experience	IT Experience
- High Tech - Energy - Government - Transportation - Health Care - Printing & Publishing - Retail	- Ecommerce - Cloud Technologies - Supply Chain Solutions - Service Oriented Architecture - B2B Integration - Business Intelligence - Custom App Development

Agenda

- *What's in your Chain?*
    The Journey, Challenges, and Opportunities
- Cloud Enabled Innovation and Digital Transformation
    Smart Modes, Smart Nodes, and the Smart Web
- Empowering the Next Generation of Innovative Chains
- Case Studies and the Cloud Continuum
- Digital Transformation Enabling New Business Models
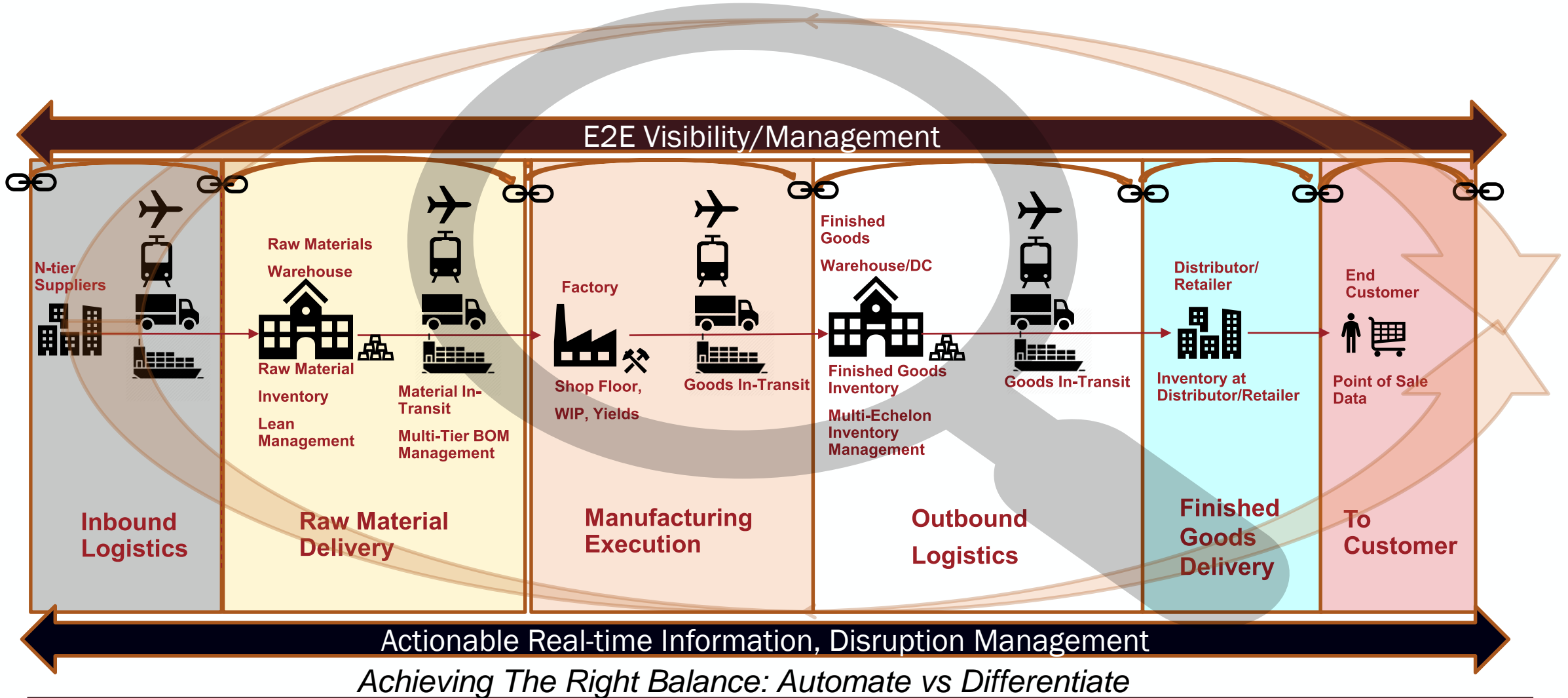- Conclusion, The Road Ahead

Zooming into the Chain...

E2E Visibility/Management

| Inbound Logistics | Raw Material Delivery | Manufacturing Execution | Outbound Logistics | Finished Goods Delivery | To Customer |

- **N-tier Suppliers**
- **Raw Materials Warehouse** — Raw Material Inventory, Lean Management
- **Material In-Transit** — Multi-Tier BOM Management
- **Factory** — Shop Floor, WIP, Yields
- **Goods In-Transit**
- **Finished Goods Warehouse/DC** — Finished Goods Inventory, Multi-Echelon Inventory Management
- **Goods In-Transit**
- **Distributor/Retailer** — Inventory at Distributor/Retailer
- **End Customer** — Point of Sale Data

Actionable Real-time Information, Disruption Management

Achieving The Right Balance: Automate vs Differentiate

Cloud Enabled Innovation and Digital Transformation:
Smart Modes, Smart Nodes, and the Smart Web

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Revolution, Rise, and Fall…

Industrial Revolution 4.0

- 1.0: Locomotives
- 2.0: Electricity
- 3.0: Computers/Microprocessors
- 4.0: SMAC Revolution- Social, Mobile, Analytics, Cloud *(IT Wave 5.0)*

On the Rise…

- Complexity of Global Networks
- Disruptions, Geopolitical Instability
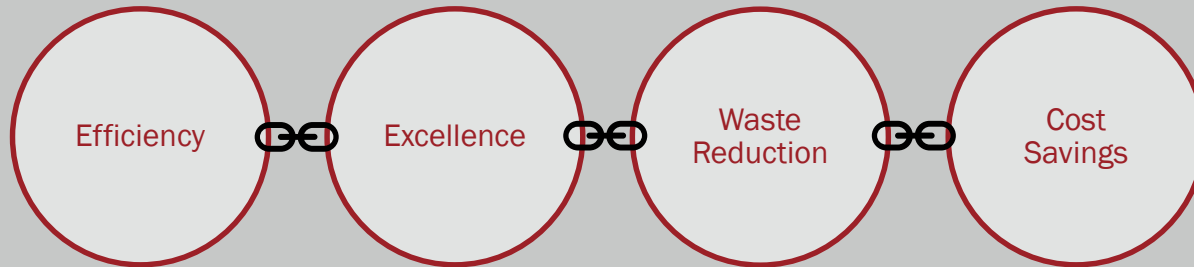- Country Specific Regulations
- Smart Modes, Smart Nodes, Smart Web

On the Decline…

- Cost of Devices and Sensors
- Time to Billion Dollar Valuation
- Spatial, Temporal Considerations
- Latency, Lead Times, Lifecycles

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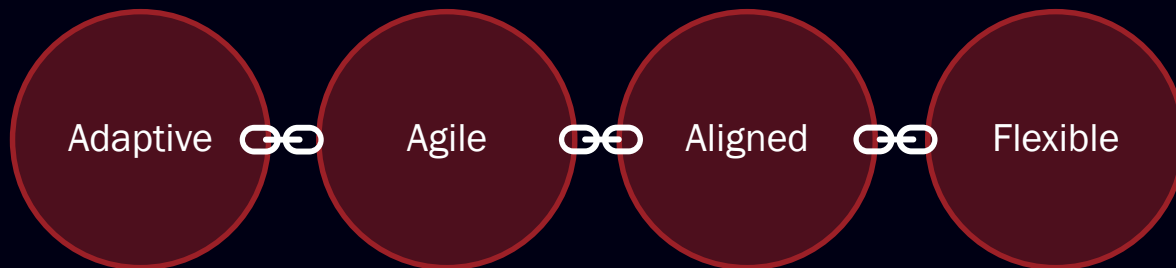# Smart Modes: Bi-Modal Chain Innovation and Transformation

Mode 1: The Linear Chain

Efficiency — Excellence — Waste Reduction — Cost Savings

Optimized for Efficiency

- Lean Manufacturing
- Predictable Operations
- Continual Efficiency Improvement
- Risk Mitigation/Prevention

Mode 2: The Intelligent Triple-A Chain

Adaptive — Agile — Aligned — Flexible

Optimized for Rapid Response

- Experimentation, New-Market Testing
- New Shipping Strategies
- Pop-up Fulfillment Centers
- On-demand Warehousing

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Smart Nodes: Opportunities and Outcomes

- Sense→Communicate→Respond, Predict/Pre-empt
- Near-Real-Time Event/Alert/Exception
- Digitalization and Digital Disruption

Smart Nodes in an Innovative Chain

Improved Dashboards, Visualization

Actionable Near-RealTime Information

Operational Execution Performance Tracking

Reactive->Proactive

Smart Web: Demand Web, Supply Web, Logistics Web

- *What do our Customers want? How do they like our Product? How is Supply meeting Demand? How's our Logistics Network performing?*
  - Factors: Environment, Labor, Political, Social, Weather
  - Social Graph->Commerce Graph
  - Geo-coding, Natural Language Processing, Sentiment Overlay
  - Map-based Visualization, Track & Trace Time/Location
  - Layering Order Info, Supply Chain Data
 - Rapid Response by Dynamic Association & Prediction

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The ABCs of Innovation

- **A**dditive Manufacturing, **AI**, **A**dvanced Analytics, and **A**utomation
- **B**ots, **B**eacons, **B**lockchains,
- **C**loud-Enabled, **C**ognitive Services
- **D**eep Learning, **D**rones, **D**riverless Vehicles,
- **E**mbedded Intelligence and Awareness, **E**dge Innovation
- **F**inal Mile Visibility
- **G**eo-Fencing/Alerting
- **H**andheld Devices with **H**olistic intelligence, **H**igh Performance Computing
- **I**oT
- **J**ust in Time Capacity Planning using Machine Learning
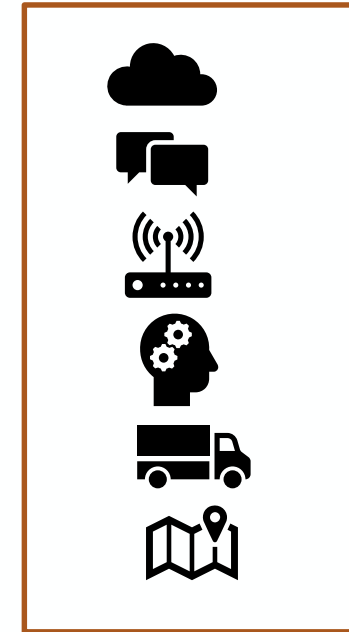
Enabling the Next Generation of Innovative Chains...
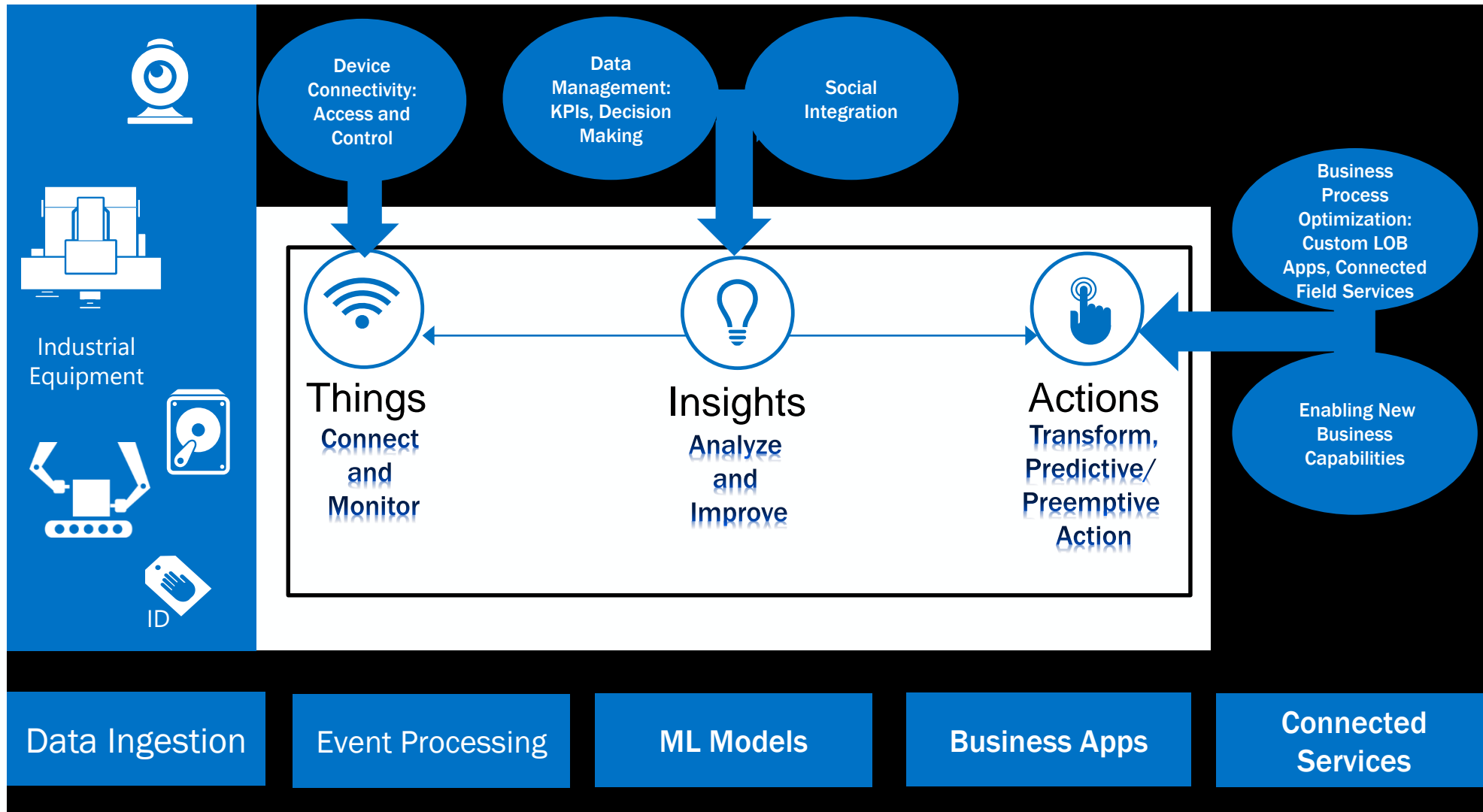
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Technology Fueled Disruption

- High Tech Proliferation

- Technology Innovation outpacing Business Innovation

- Digital Transformation of the Chain

Cloud, Edge Computing
AI/Machine Learning
Advanced Analytics
Automation
Internet of Things (IoT)
Big Data

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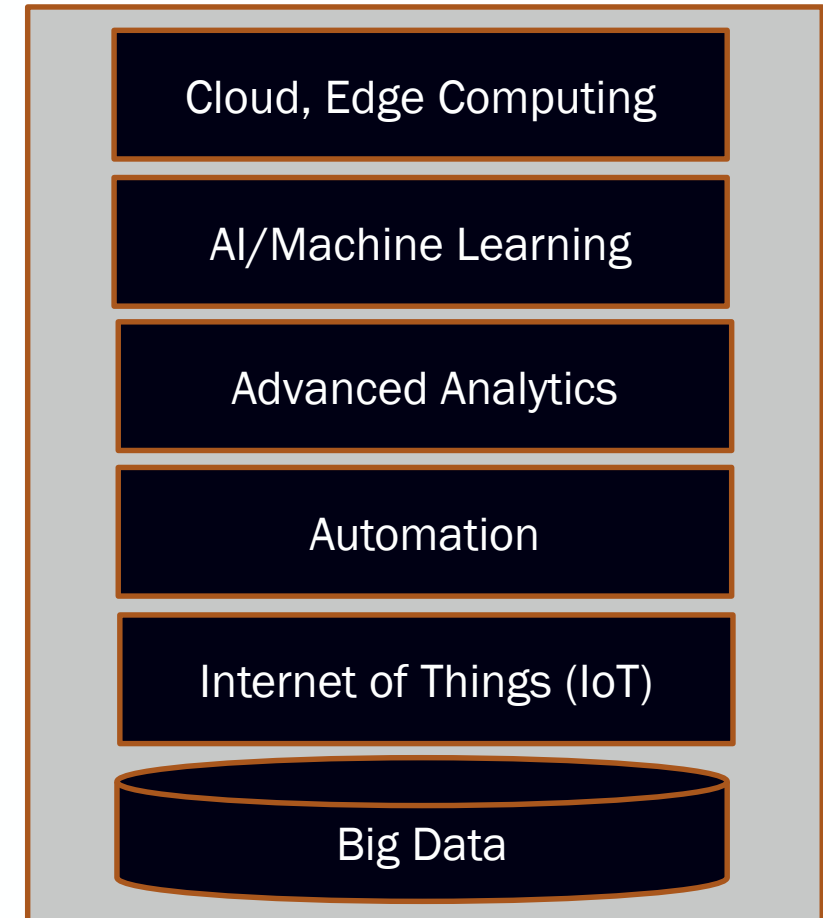
Multi-Dimensions of Innovation

- Multi-Dimensional Grid: One Size Does Not Fit All
- Product Profile, Channels, Global/Environmental Factors
- Design for Operations, Integrated Business Planning (S&OP&E)
- Physical Innovation vs Informational Innovation
- Sustaining Innovation vs Disruptive Innovation
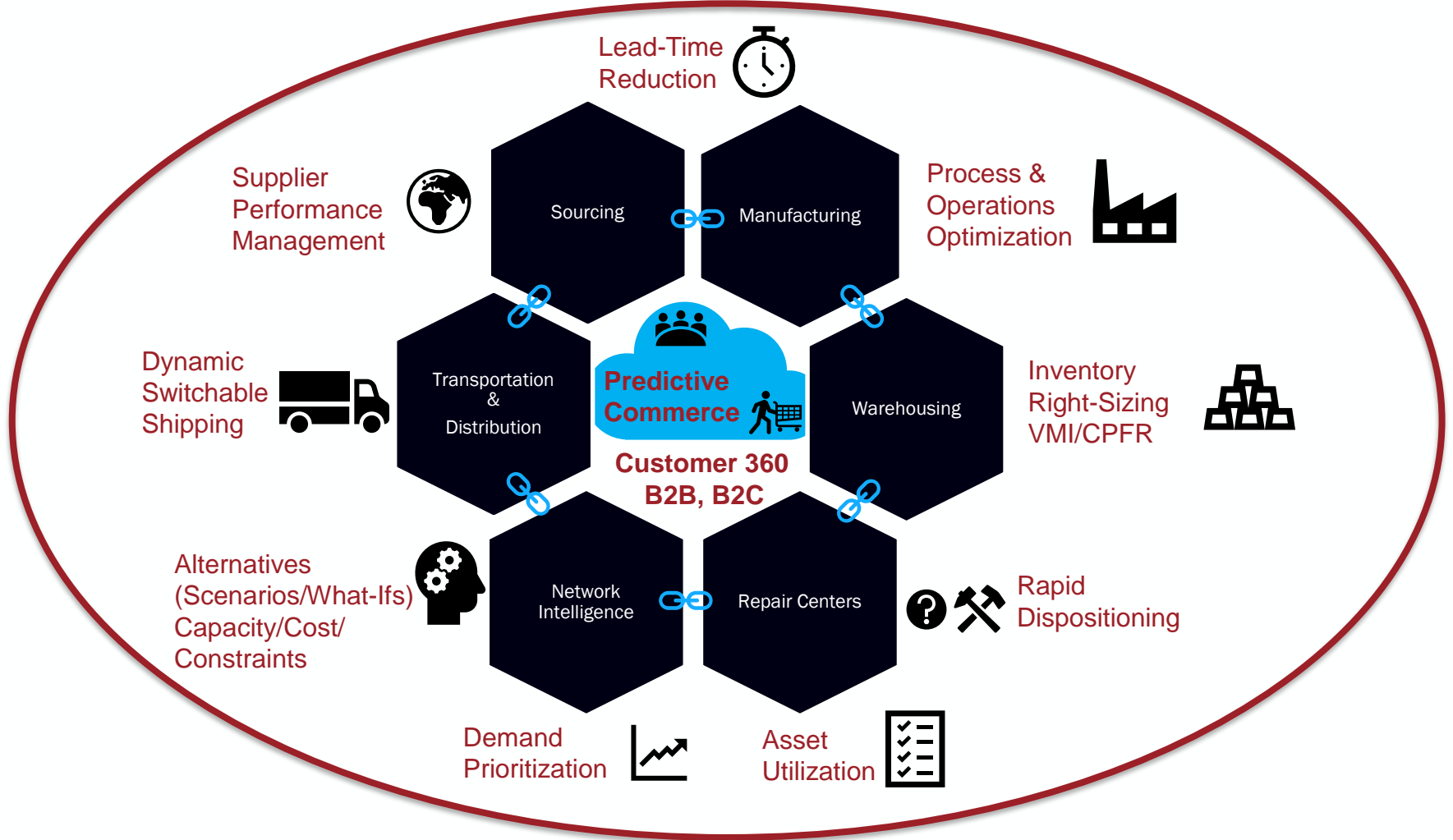- Machine Learning for Marketing, Manufacturing, Logistics, and Warehousing

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The Role of IoT, AI, and ML

Device Connectivity: Access and Control

Data Management: KPIs, Decision Making

Social Integration

Business Process Optimization: Custom LOB Apps, Connected Field Services

Enabling New Business Capabilities

Industrial Equipment

ID

Things — Connect and Monitor

Insights — Analyze and Improve

Actions — Transform, Predictive/Preemptive Action

Data Ingestion

Event Processing

ML Models

Business Apps

Connected Services

Cross-Industry Innovation

FINANCIAL SERVICES

HEALTHCARE

TRAVEL & TRANSPORTATION

SPORTS

PUBLIC SAFETY

CITIES

AGRICULTURE

RETAIL AND CONSUMER GOODS

EDUCATION

ENGINEERING & MANUFACTURING

ENERGY & EXPLORATION

WHOLESALE & DISTRIBUTION

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The Orchestrated Chain

Lead-Time Reduction

Supplier Performance Management

Process & Operations Optimization

Sourcing

Manufacturing

Dynamic Switchable Shipping

Transportation & Distribution

Predictive Commerce

Customer 360 B2B, B2C

Warehousing

Inventory Right-Sizing VMI/CPFR

Alternatives (Scenarios/What-Ifs) Capacity/Cost/ Constraints

Network Intelligence

Repair Centers

Rapid Dispositioning

Demand Prioritization

Asset Utilization

Chaining together Smart Modes, Smart Nodes, and the Smart Web

Case Studies and the Cloud Continuum

Innovations in Digitalization

Smart Factories

Smart Automation
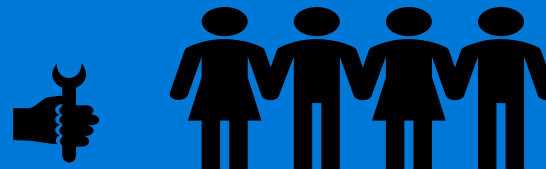
Smart Operations

Smart Distribution
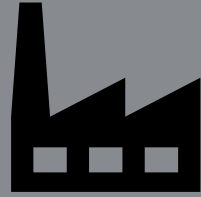
- Device Connectivity
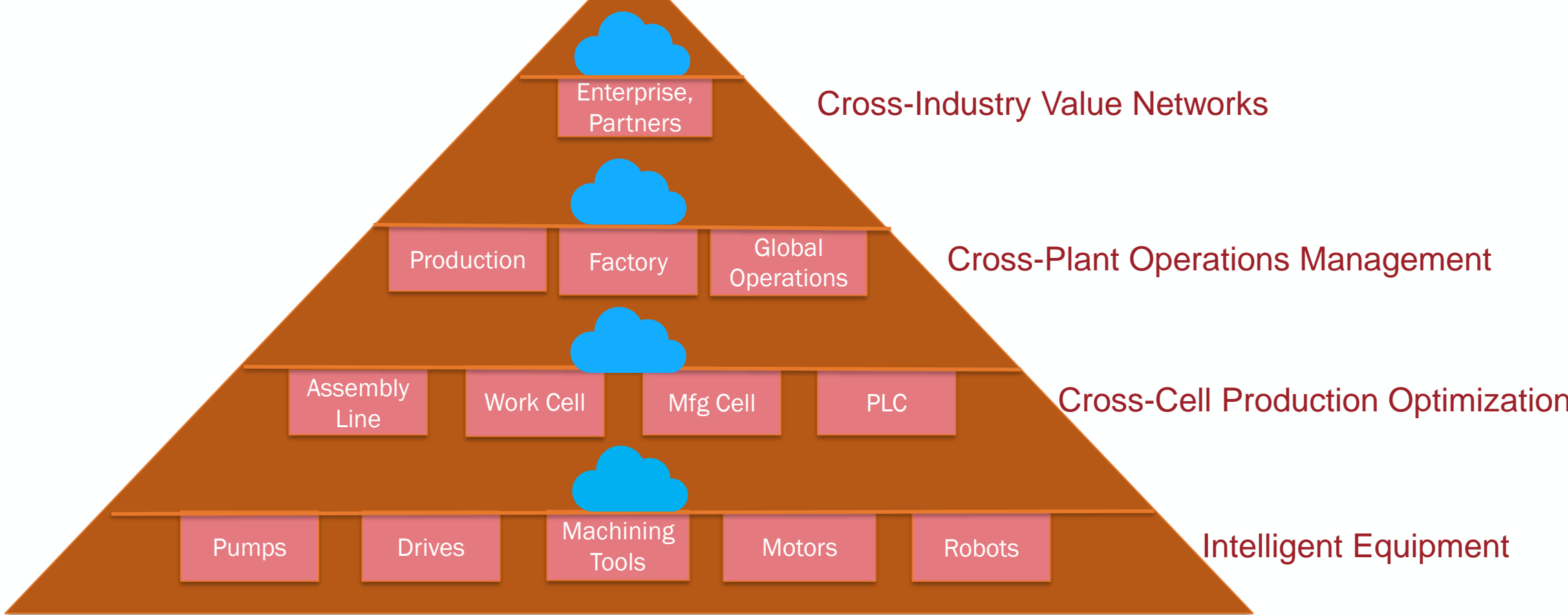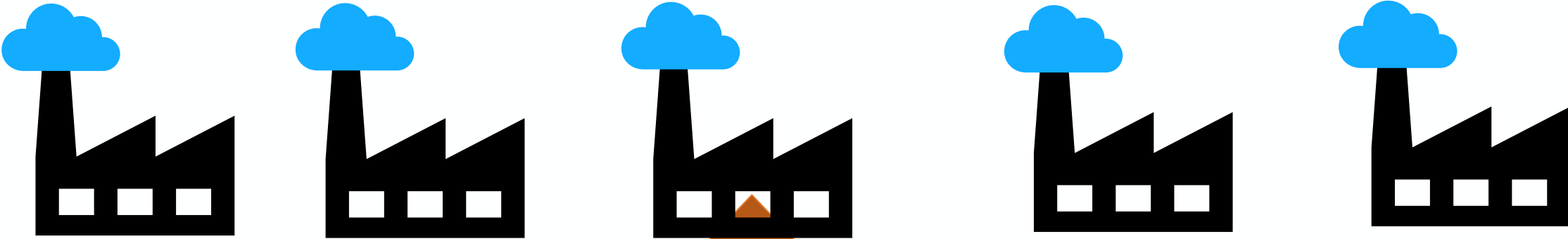- Management of Assets/Sensors

- Data Insights, Advanced Analytics
- Big Data Visualization
- Social/Enterprise Integration

- Remote Monitoring and Control
- Predictive/Pre-emptive Maintenance

- Connected Field Services
- Scenario based Contingency Planning

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Next-Gen Digital Plants and Digital Twins

Enterprise, Partners

Cross-Industry Value Networks

Production | Factory | Global Operations

Cross-Plant Operations Management

Assembly Line | Work Cell | Mfg Cell | PLC

Cross-Cell Production Optimization

Pumps | Drives | Machining Tools | Motors | Robots

Intelligent Equipment

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Reactive→ProActive & Predictive→Pre-emptive Chains

- Hindsight→Insight→Foresight
- Hot and Cold Path Analytics
- Automated Triggering of Backend Processes
- Machine Learning enabling Training Opportunities
- Improving Process Efficiencies
- Effective and Impactful Risk Management

Systems of Record→Systems of Engagement→Systems of Intelligence

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Innovations in high-tech predictive capabilities, minimizing downtime

Challenge

Better predict errors or failures on assembly floor before they occur, saving customers' time and money.

Strategy

Transformed its manufacturing production line with advanced analytics solutions like Azure IoT Suite and Cortana Intelligence Suite.

Results

- Predicted machine processes that will slow down or fail with an 80% accuracy
- Reduced costs of scrap and re-work of 17%
- Delivered energy savings of 10%

"Since deploying the Microsoft predictive analytics solutions, we have seen at least an 80% accuracy rate in the prediction of machine processes that will slow down or fail, contributing to a scrap and rework savings of 17 percent."

— Clint Belinsky, Vice President, Global Quality, Jabil

JABIL

Minimizing downtime with predictive capabilities

Smart Automation: Artificial Intelligence (AI) and Human Machine Interface (HMI)

- Mobile Robotics, Robot Assisted Activities
- Working in Hazardous Environments
- Wearables
- Advanced Analytics
- Human/Robot Co-Workers

Smart Automation: Robotics leader delivers a safe and versatile solution

Challenge

- KUKA aims to make industrial robotics more powerful, safe, sensitive, and versatile

Solution

- The company incorporates Microsoft cloud, IoT, and analytics solutions in a safe, light-weight robot for many possible uses

Benefits

- Enables managers to identify and address supply-chain issues
- Ensures uninterrupted, safe operation of robots
- Supports a wide range of possible production scenarios

KUKA

"Thanks to disruptive breakthroughs in robotics technology combined with the power of the cloud, we were able to come up with a smart, robot-based automation solution that is both IoT and Industry 4.0 ready."
– Dominik Bösl, Corporate Innovation Office, Technical Fellow, KUKA

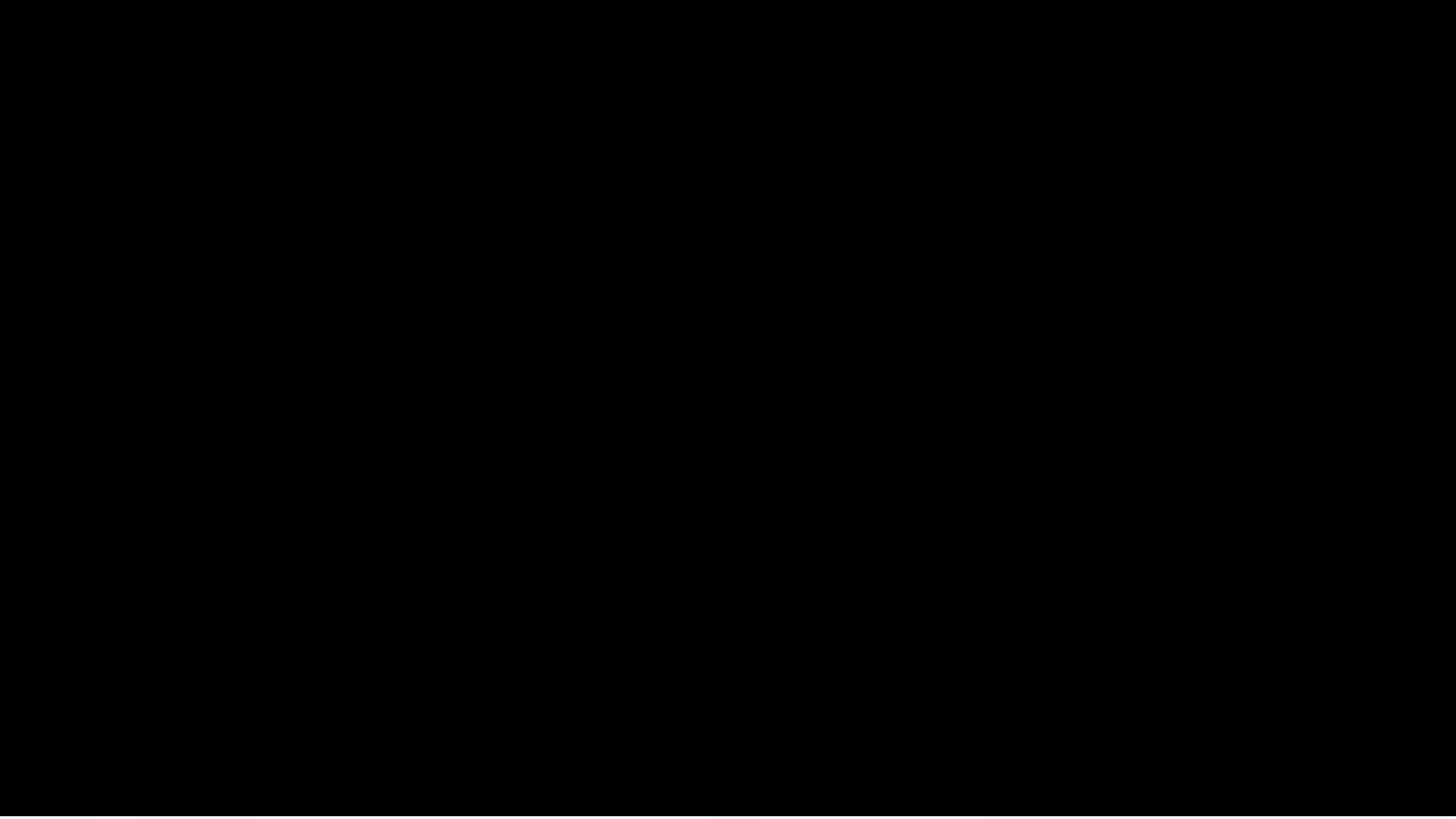# Smart Operations: Connected Services with IoT and Mixed Reality

- Remote Monitoring of Sensors/Advanced Analytics
- Connected Dispatch and Field Services
- Integration of People to Business Processes
- Inventory and Spare Parts Visibility and Access
- Enabling Pre-emptive Maintenance
- Mixed Reality: Digital on Physical World
- Historical Data Superimposed on Physical Device
- Obsessing over Customer Experience

ThyssenKrupp

THE INTERNET OF THYSSENKRUPP'S THINGS IS GIVING THE COMPANY A COMPETETIVE EDGE,TRANSFORMING MAINTENANCE OPERATIONS, CREATING NEW EFFICIENCIES IN WORKFLOW, CUTTING OPERATING COSTS, AND INCREASING ELEVATOR UPTIME
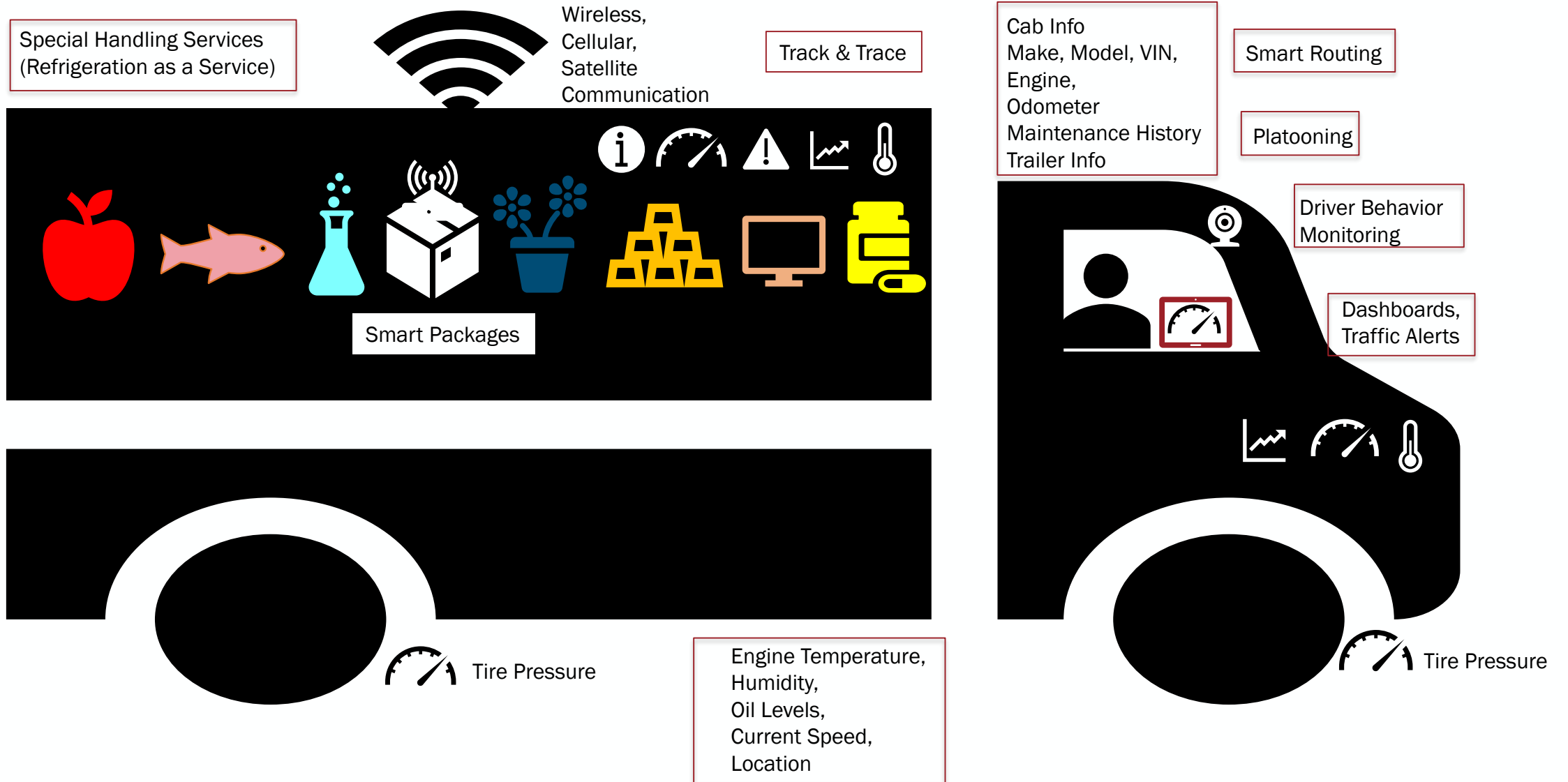
Innovations in Pre-emptive Maintenance

Smart Distribution: Remote Fleet Management/Monitoring

Special Handling Services (Refrigeration as a Service)

Wireless, Cellular, Satellite Communication

Track & Trace

Smart Packages

Cab Info
Make, Model, VIN,
Engine,
Odometer
Maintenance History
Trailer Info

Smart Routing

Platooning

Driver Behavior Monitoring

Dashboards, Traffic Alerts

Tire Pressure

Engine Temperature,
Humidity,
Oil Levels,
Current Speed,
Location

Tire Pressure
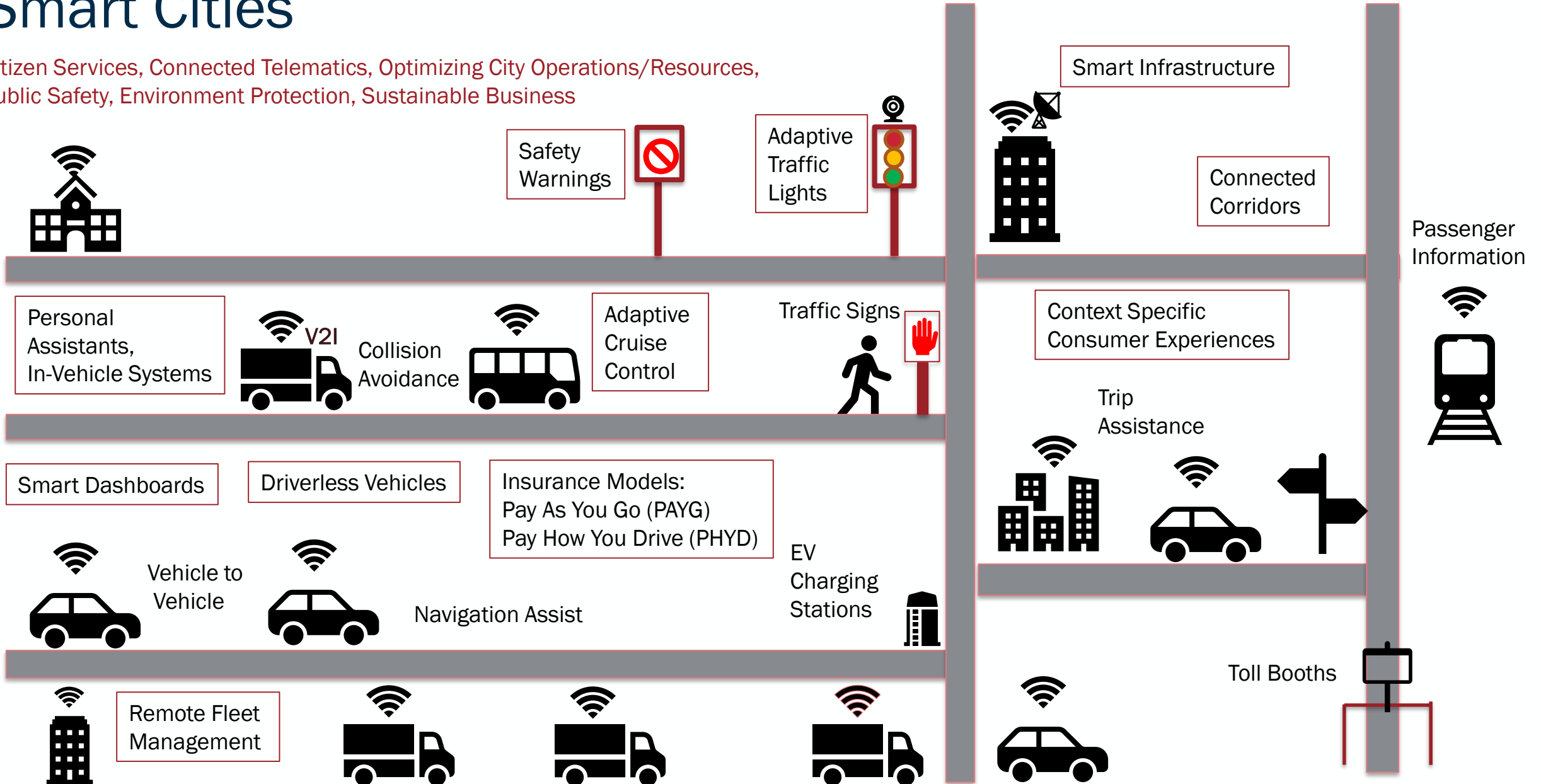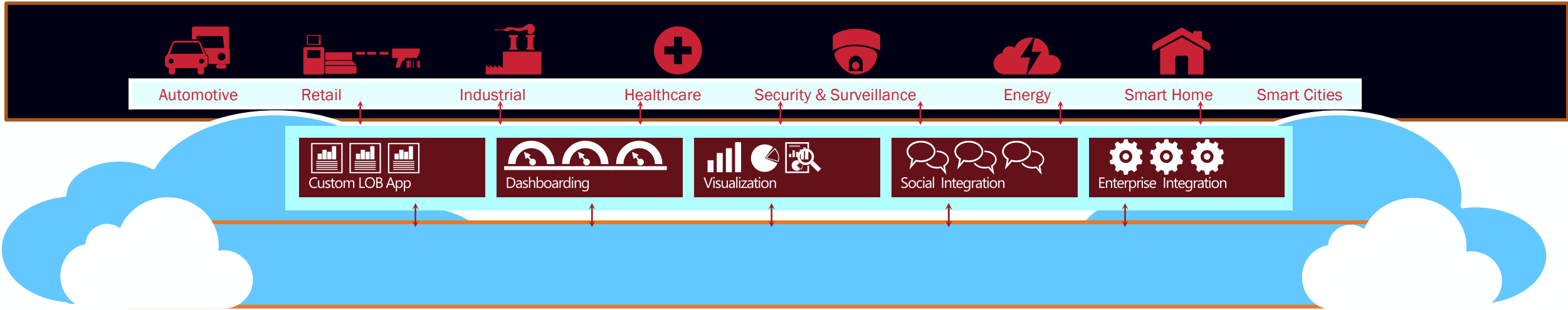
Smart Food Distribution

Mushtaque Ahmed
COO
JJ Food Service Ltd

Smart Cities

Citizen Services, Connected Telematics, Optimizing City Operations/Resources,
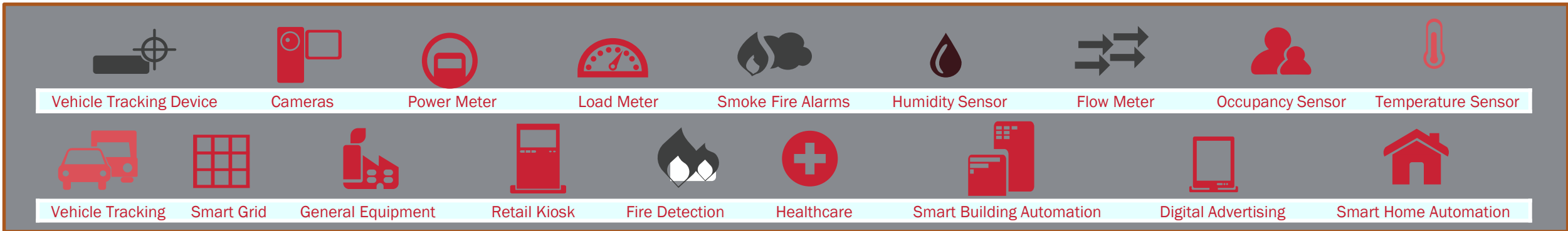Public Safety, Environment Protection, Sustainable Business

Smart Infrastructure

Safety Warnings

Adaptive Traffic Lights

Connected Corridors

Passenger Information

Personal Assistants, In-Vehicle Systems

V2I

Collision Avoidance

Adaptive Cruise Control

Traffic Signs

Context Specific Consumer Experiences

Trip Assistance

Smart Dashboards

Driverless Vehicles

Insurance Models:
Pay As You Go (PAYG)
Pay How You Drive (PHYD)

EV Charging Stations

Vehicle to Vehicle

Navigation Assist

Toll Booths

Remote Fleet Management

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Smart Connected Services

Automotive | Retail | Industrial | Healthcare | Security & Surveillance | Energy | Smart Home | Smart Cities

Custom LOB App | Dashboarding | Visualization | Social Integration | Enterprise Integration

Device Management | Data Insights | Advanced Analytics | Process Optimization

Vehicle Tracking Device | Cameras | Power Meter | Load Meter | Smoke Fire Alarms | Humidity Sensor | Flow Meter | Occupancy Sensor | Temperature Sensor

Vehicle Tracking | Smart Grid | General Equipment | Retail Kiosk | Fire Detection | Healthcare | Smart Building Automation | Digital Advertising | Smart Home Automation

Journey, Challenges and Opportunities: A Recap

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Multiple Facets of Innovation- A Recap

Intelligent Cloud and Edge

Artificial Intelligence, Machine Learning

SMAC Revolution

Technology Democratization Smart Modes, Smart Nodes, Smart Web

Emerging Robotics, Automation

Big Data Technologies- Information Velocity, Volume, and Variety

Internet of Things
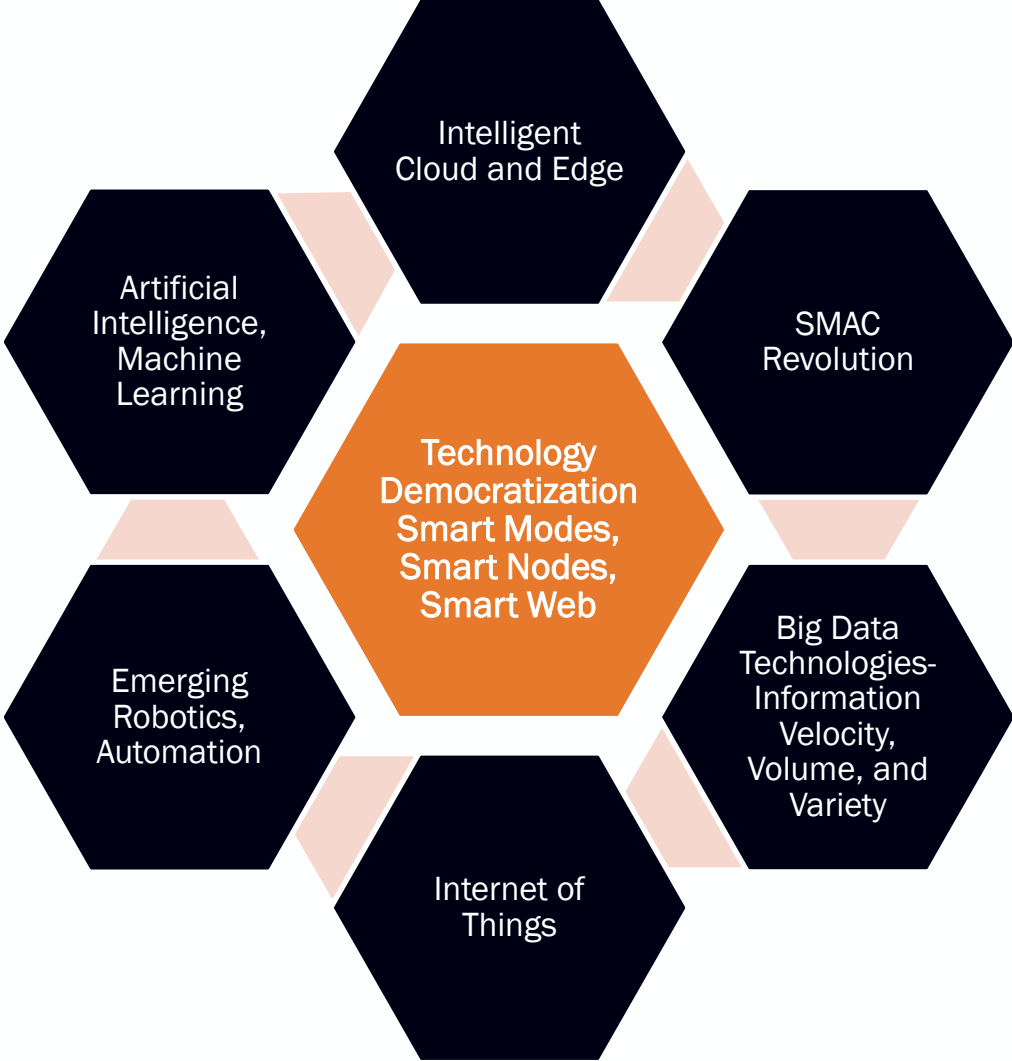
Realizing the Orchestrated, Innovative, Anywhere-to-Anywhere Chain

- Anywhere-to-Anywhere (Buy/Make/Move/Store/Ship)
- Plug and Play: Modularized Components for Core Services + Add-Ons
- Omnichannel Fulfillment
- Cloud and Edge Innovation
- Smart Segmentation to suit Market DNA
- Crowd Sourcing and Collaboration Networks
- Combining Human and Digital Intelligence

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And now the answer to the question: "What's in your chain?" in the cloud continuum...
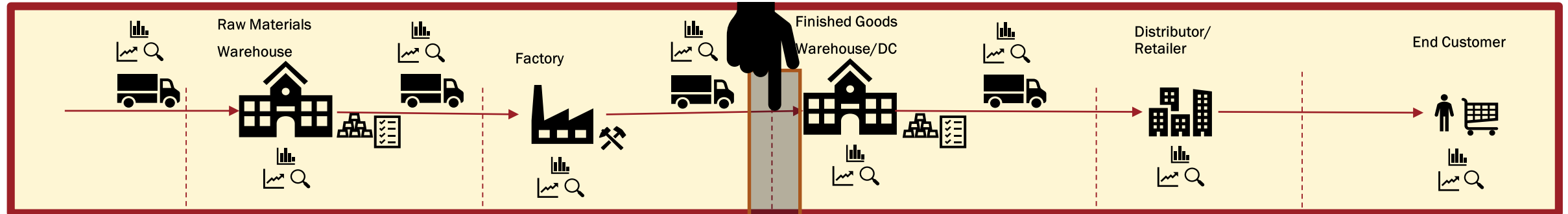
Cloud, Big Data, IOT, Advanced Analytics, Machine Learning (End-to-End Supply Chain Visibility and Management)
Collaboration, Shop Floor Integration, Network Utilization, Transportation Optimization, Fleet Monitoring, Shipment Visibility, Customer 360

• Logistics	• Analyze Material Delivery	• Manufacturing Execution	• Manage Capacity	• Manage Distributed Orders	• Field Data:
• Optimize Transportation	• Monitor Inventory (Component Inventory, Inbound In-Transit, At-Rest)	• Shop Floor Orders	• Manage Inventory	• Manage Sales	• Customer Product Experience
• Remote Monitoring		• Asset Management	• Allocate Resources	• Finished Goods Inventory in the Channel	
• Vehicle-Centric Data	• Strategic Goods vs Commodities	• Remote Monitoring/ Control	• Automated Guided Vehicles	• VMI	
• Driver-Centric Data	• Automated Guided Vehicles	• MRO/WIP Inventories	• Postponement	• CPFR	
• Pre-emptive Maintenance	• Component Inventory in Supplier Locations	• Predictive/Pre-emptive Maintenance	• Bundling/ Value Added Services	• Omni-Channel	
• Geo-Fencing	• Multi-Tier BOM Management	• HMI, Robotics, Automation		• Demand Capture (POS)	
• Traffic/Weather Alerts					

Device, Asset Connectivity	Data Insights	Advanced Analytics	Business Process Optimization
Visibility and Control	Manage KPIs Improve Operational Performance Improve Decision Making	Hindsight->Insight->Foresight	Integrate People and Processes

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Digital Transformation Enabling Innovative Business Models

- An Example

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Conclusion, The Road Ahead...

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THANK YOU

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