Cold Supply Chain 4.0: Focus on Vaccine

Webinars that Matter in Times of Turblence

25 March 2021

MODERATED BY

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Global Perf Excellence Webinars
Team Lead, IIESE

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Panasonic Health Care

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Geoff Annesley
EVP One Network Ent.
High Tech Life Sciences

Aakanksha Joshi, Advisory Data Scientist, IBM Data Science and AI Elite

David Melia
President & Chief Strategy Officer
blueRover Inc
Agenda

11:00 Scott Tee up
11:07 Key Questions and Story Line for our Webinar today
11:10 Panel Dialogue on questions
11:55 Close Out
Panel Questions

Key Questions we want to explore:

1. A quick, layman’s description of Supply Chain 4.0

2. How do temperature requirements alter how SCM needs to be managed, high level?

3. How has the Vaccine Distribution (Implementation and Deployment) created unique challenges to Logistics and Distribution (SC)?

4. What are the Solutions (Integration of People, Strategy, Process, and Technology) that you are contributing to, you see (and are part of) in this huge undertaking?

5. What’s ahead? (6-12 months horizon)
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Our Global Personal and Professional Development Series for IISE Members and Customers……

THEMES:

• Supply Chain 4.0
• Enterprise Transformation and OpEx
• Operational Analytics
• Cultures to support Perf Excellence
• Integration of People, Strategy, Process and Technology
• Integrated LeanSigma
• Industry, Service, Healthcare 4.0
• Personal and Professional Learning and Development
• Change Leadership and Management
• Navigating through Turbulent (VUCA) times
Performance Excellence

TPG TV Operational Excellence Channel

- Benchmarking Industry: How to Engineer Performance Excellence
- Pioneering and Engineering a New World
- Risk Management and Resilience Engineering Strategies for Supply Chains
- Business Continuity Strategies and Tactics in Periods of Major Disruption
- Smart Supply Chains and Industry 4.0
- Restarting the Economy: Guidance on the Backside of the Disruption
- Rapid (AGILE) Deployment and Execution of Integrated Systems Engineering Principles and Methods in Times of Major Disruption
- Creating Cultures that Support Full Potential Performance/Operational Excellence

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Our Global Personal and Professional Development Series for IISE Members and Customers......


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- Best Practice Case Studies
- Career and Leadership Development
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- Industry and Service Systems 4.0
- Integrated Lean and Six Sigma
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- Personal and Professional Mastery
ISE Body of Knowledge is a rock solid foundation for SC4.0

IISE Body of Knowledge

1. Work Design & Measurement
2. Operations Research & Analysis
3. Engineering Economic Analysis
4. Facilities Engineering & Energy Management
5. Quality & Reliability Engineering
6. Ergonomics & Human Factors
7. Operations Engineering & Management
8. Supply Chain Management
9. Management Systems Engineering
10. Safety
11. Information Engineering
12. Design & Manufacturing Engineering
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Industry and Service Systems 4.0
Explore the major “movements” and hear thought leaders in Industry 4.0, Healthcare 4.0, Supply Chain 4.0, Service Systems 4.0, more.

- Supply Chain 4.0: Benchmarking to latest Innovations in Logistics and Supply Chain Leadership and Management
- Service Systems Engineering Outstanding Innovation
- The Industry Practitioner Track Orlando 2019: Sneak Preview
- Smart Supply Chains and Industry 4.0
- The Impact of Industry 4.0 on Business Models
- The ISE Role in Service Systems Engineering: Service 4.0 Overview, Digital Transformation in Healthcare and Enterprise Shared Service
- Whetting your Appetite (“Aperitivo”): All you Need to Know about Industry 4.0

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Operational and Business Process Excellence

Some organizations integrate Business Process Excellence perfectly. Others need a well-designed program. We’ll show you how to jump-start a great Op Ex Program.

- Industry Benchmarking: Operational Excellence Best Practices
- How to Design, Develop and Execute “Flow Workshops”
- Principles and Tools to Ensure Optimal Process Performance
- IISE Outstanding Capstone Senior Design Projects
- Pioneering and Engineering a New World
- Resilience Re-examined: Reengineering How We do Business and Ensure Public Safety
- Restarting the Economy: Guidance on the Backside of the Disruption
- Business Continuity Strategies and Tactics in Periods of Major Disruption
- Navigating Your Business Through the COVID Crisis
- Creating and Ensuring Superior Client Experience
- How to Create People Centered Operational Excellence Strategies
- Diversity, Equity, and Inclusion: Progress and Performance Assessment from an ISE Perspective
- Creating Cultures that Support Full Potential Performance/Operational Excellence
- IISE Performance Excellence Event of 2020: Sneak Preview

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IISÉ’s Operational Analytics Certificate and Certification Program

In Partnership with:

The Poirier Group
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Delivered Uniquely:

IISÉ TV – Operational Analytics Channel

- 10 Video Modules with ‘youtube’ sized segments for easy consumption/learning
- Certificate requires an on-line final exam
- Certification requires the Certificate plus a reduction to practice, proof of skill project

- Module 1: OA Thought Leader Perspectives
- Module 2: Operational Analytics Perspectives, Points of View and Foundational Principles and Methods and Models
- Module 3: Operational Analytics: The Foundational Data Management Role
- Module 4: Operational Analytics: The Analyst, Decision/Action Support Role
- Module 5: Data Sciences and The New Industrial and Systems Engineering
- Module 6: Operational Analytics: The Evaluation Role
- Module 8: Operational Analytics: Putting it All Together: Case Studies
- Module 9: The Role of Data and Information (Engineered Management Systems) in Periods of Major Disruption, Reducing the Latencies
- Module 10: Creating Cultures that Support Full Potential Performance/Operational Excellence
Covid-19 is Amplifying the Need for Data & Information-Based Decisions Rapidly, w/ Minimal Latency, and Maximum “Ah-Ha”.

**Traditional Strategies Need Modified to Position Organizations Correctly to Stay Ahead of the Curve**

**Must do #1, Reduce Latency to Decision to Results**

- Data capture must be efficient, effective, reliable
- Analysis must provide “fastest path” to CDA
- Positioning strategy must result in rapid alignment to get to correct decision fast

**Must do #2, Accelerate the Triangle**

- Organizations must make the quick judgement – throw out or keep w/ 80% probability
- Support staff must integrate data creatively, from multiple sources, rapidly using atypical tools
- Visualizations must minimize the latency to get to the “Ah-Ha” moment
You have a special invitation to join IISE TV and view and share the recording(s) from this webinar event.

A pdf copy of any support material will be made available in the IISE TV Channel also.

Questions? Scott will review them as they come in and integrate into the dialogue as appropriate and time permits.

Follow up questions are welcomed and contact information is provided at the end of the presentation.

And, the Recording and Presentation pdf will be available on IISE’s website for IISE members shortly after the webinar date—Training/Webinars/Performance Excellence.

Certificates of attendance are mailed after the webinar is completed (typically 5 days post the event).

**Membership Has Privileges!!**
ISE’s Create Value by Integrating People, Strategy, Process and Technology

The end2end Supply Chain and ‘Industry 4.0’ have collided and there is steady wave of tsunami’s of business process and technology disruptive innovation and integration occurring.
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5. What’s ahead? (6-12 months horizon)
Operational Excellence: Integrated Systems Engineering

Enhancing the way you think and plan

Changing the way we exchange value with our employees and manage our culture.

Leveraging hyper-connectivity and the full power of IT Enablement

What we do and how we do what we do

Strategy
Organizational Alignment
People
Speed of Trust
Performance Excellence
Flow
Process

Technology
Covid-19 is Amplifying the Need for Data & Information-Based Decisions Rapidly, w/ Minimal Latency, and Maximum “Ah-Ha”.

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Thank You!

Feel free to reach out to us:

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Customer and Member Satisfaction and Feedback Survey

Operational Excellence: Cold Supply Chain 4.0 Perspectives

You can download the deck (handouts)
You will receive an e-mail tomorrow with link to recording.
You can go to this IISE link soon and get deck and recording.
Quarter 1 Webinar Program/Lineup is a WOW!!

Mar 16: *Operational Analytics 201: The Foundational Data Role*
Registration URL
https://attendee.gotowebinar.com/register/5632689630341719824

Mar 18: *Using Control Towers to Integrate your Digital Supply Network OR Using Control Towers to Digitize your Supply Chain*
Registration URL  https://attendee.gotowebinar.com/register/7872822524972939276

April 1: *A ‘Big Interview’ with a Personal and Professional Mastery Coach*
Registration URL
https://attendee.gotowebinar.com/register/5274860167335450892

April 15: *Operational Excellence: Strategy and Migration Plan Development for Large-Scale Improvement Initiatives*
Registration URL
https://attendee.gotowebinar.com/register/6774488475322050064

April 27: *Operational Analytics 301: The Analyst and Decision/Action Support Role*
Over 50 recorded Webinars on a wide spectrum of Performance Excellence Topics are available to members of IISE by clicking on this link.

Our IISE TV Channel is allowing you to customize what you have personalized access to.

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Membership Has Privileges—Consider joining IISE?

https://www.iise.org/Details/?id=560
IISE Virtual Annual Conference(s)

- Over 850 professionals, academicians, and students attended our most recent Virtual Annual Conference.

- We envision over 2000 at next year's Virtual Annual IISE Conference.

- No travel, lower registration fees, pick and choose live sessions, have access to session recordings and presentations for up to a year!

- Virtual Networking worked great!!

- Can purchase access to our library of sessions from the conference even if you did not get a chance to attend.

- Sampling of Sessions on next slide
Sampling of Sessions just from the Performance Excellence Track for May 2021

Industry Best Practices Virtual Benchmarking:

- Healthcare
- ISE Consulting
- ISE in Small and Medium Size Enterprises
- ISE Deployments in Large Enterprises
- Simulation to accelerate Benefits Realization

Industry 4.0, Smart Factories

Operational Analytics

Strategies for Designing and Executing Disruptive Innovation

Very difficult to get this kind of compressed learning at the price of registration anywhere, so please consider our upcoming Conference and Track.
Thank You!

An e-mail tomorrow from Go2Webinar will provide a link to the recording and you can also access the presentation and recording on the IISE website.


Contact us for More Info or to provide feedback:

For IISE Webinar Sponsorship opportunities Trent Sexton:
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For IISE Webinar Ideas, Suggestions, Feedback, Requests, Scott Sink:
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  • ssink@jumpcurves.com
Support Slides from:

- Aakanksha Joshi
- Geoff Annesley
- Joe LaPorte
- David Melia
AI @ Scale in the Supply Chain Industry

Aakanksha Joshi
Advisory Data Scientist, IBM
Supply Chains are digitally transforming underpinned by Data Science, Machine Learning and Artificial Intelligence
Evolution of the Supply Chain

In the fourth industrial revolution, digital analytics enables a new level of operational productivity.

1st
Mechanization, water power, steam power

2nd
Mass production, assembly line, electricity

3rd
Computer and automation

4th
Cyber physical system

Maturation of new cyber physical technologies (artificial intelligence, 3-D printing, robotics)
Data analytics driving efficacy and new business models
Pervasive sensing and actuation
Ubiquitous connectivity throughout the supply chain
Unprecedented levels of data and increased computing powers

Source: Forbes; World Economic Forum
Evolution of Artificial Intelligence

The concepts have been around since 1950s.

1938-1946: Golden age of science fiction

1949: Manchester Mark 1, the first stored-program computer, is invented

1950: Can machines think? Turing test proposed by A. Turing

1955: Logic Theorists, the first AI programme, is invented

1956: Dartmouth summer conference on AI. “Artificial intelligence” is coined

1960: DARPA funds AI at MIT

1963: “In 3-8 years we’ll have a machine with the general intelligence of a human being” (M. Minsky)

1965: Moore’s Law is put forth

1968: “By the year 2001 we will have machines with intelligence that matched or exceeded human’s” (A. Clarke and S. Kubrik)

1970: Japan’s fifth generation computer project begins

1980: E. Feigenbaum introduces expert systems

1982: First publicly available speech recognition software, developed by Dragon Systems

1986: Navlab, the first autonomous car, is built by Carnegie Mellon

1997: Deep Blue defeats Gary Kasparov in chess

Source: Artificial Intelligence in Society, OECD
So, what changed in AI over the last few years?
“In 2021, AI augmentation will generate $2.9 trillion in business value and recover 6.2 billion hours of worker productivity”

– Gartner

“23% of manufactories adopting AI had average revenue increase more than 10% while 20% had cost decreased more than 20%”

– McKinsey & Company
Evolution of Analytics in Industrial Engineering

Descriptive Analytics

Analyzing the data to prove or disprove a certain hypothesis

- Statistical Methods
- Regression Analysis
- Correlation
- ANOVA
- Chi-Square
- Root Cause Analysis

Predictive & Prescriptive Analytics

Letting the models learn from structured and unstructured data

- Supervised Machine Learning
- Unsupervised Machine Learning
- Deep Learning
- Natural Language Processing
- Computer Vision
- Optimization
Supply Chain Domains Advanced by AI @ Scale

Forecasting

Planning

Risk Management
Supply Chain Domains Advanced by AI @ Scale

Forecasting

Planning

Risk Management
Demand Forecasting

Statistical approaches that use historical data to try and predict future demand have been around for decades.

What’s different now?
Machine learning and Deep Learning provide a data-centric approach that can find the patterns in large volumes of data.

Now you can build forecasting models for tens of thousands of products, where for each product a model can learn from:

- Product history,
- History of the entire portfolio/product family…
- ...and hundreds of external drivers and their histories

Today we have the data and the computational capacity to make more informed decisions at scale.
How can understanding demand better help me plan and operationalize my supply chain more effectively?
Supply Chain Domains Advanced by AI @ Scale

Forecasting

Planning

Risk Management
What **Matters** to Your Supply Chain?

- Time?
- Cost?
- Distance?
- Temperature of Storage?

How do you optimally balance everything?
Decision-Making at Scale Has Never Been More Important

Input: Key Variables

Output: Decisions

Mixed Integer Programming Optimization Model

Objective: Minimize Production Cost + Travel Cost + Backlog Cost

Constraints: Production meets demand, Production stays within capacity limits
How does this help me with **risks**? I can’t optimize for things I don’t know...
Supply Chain Domains Advanced by AI @ Scale

- Forecasting
- Planning
- Risk Management
Visibility Into the End-to-End Supply Chain is Necessary
With that visibility you can start to answer questions like:

• Where is the supply chain do the uncertainties lie?

• When do I need to prepare for changes in production capacity due to predicted required maintenance?

• How will fluctuations in demand impact my overall supply chain?

• How resilient is my supply chain?
Proactive + Reactive Risk Mitigation

You can be **proactive** about monitoring, managing and mitigating risks in your supply chain.

You can also be **just-in-time reactive** by automating alerts set to monitor certain performance thresholds.
Where do we get started?

DMAIC

DEFINE
- Business Understanding

MEASURE
- Data Understanding

ANALYZE
- Data Preparation
- Modeling

IMPROVE
- Evaluation
- Deployment

CONTROL
- Monitoring
What we discussed today is only the beginning of this AI-driven evolution of the Supply Chain. To make the most of this technology we still need **stronger data governance, standardized information architecture** and **increased trust and transparency** to build the next generation of supply chains.
Thank you!

Aakanksha Joshi
Advisory Data Scientist, IBM
Multi Party Networks for Chain of Custody
E2E Traceability & Genealogy

Geoff Annesley, EVP
One Network Enterprises
One Network’s Real Time Value Network™ (RTVN)

Single healthcare operations solution deployed on a multi-party digital network platform that enables you and your entire eco-system (patients, hospitals, clinics, GPOs, suppliers, distributors, homecare & contract service providers) to synchronize and optimize your entire healthcare network in real time.

- Single Network platform
- Uses algorithms, real-time
- Single Version of Truth (SVOT)

*Automated Real Time Alignment of Medical Supply & Services with Patient Needs to Lower Costs, Scale and Improve Patient Service Levels*
Serialized Asset Tracking and Issue Resolution on a SVOT Network simplifies adherence to compliance across countries and organizations.
In Country Control Towers
Hospitals, Clinics, Ministry of Health, Carriers, Suppliers, AID Agencies

Hybrid Order & Delivery Models
- Mfg Direct to Large Hospitals
- CMS to Small/Medium Clinics

Multi Level Site Models
- CMS to Region
- Region to District
- District to Hospitals

Global Control Tower

GS1 Compliant Track and Trace

Supply & Transport
Autonomous AI Forecasting
Predictive Replenishment
Global Procurement
Multi Party Network Visibility | Planning | Execution | Analytics

30 African Countries   20 European Countries

In Country Towers

Nigeria

Rwanda

Ghana

Multi Hub Transparency

IHS
JRL

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68 Countries

- Medical Services
- Immunization
- Emergency Relief

- Malaria
- Tuberculosis
- Aids
- Measles-Rubella...

OTIF & Reliability

Vaccine Rates & Drug Availability

Transparency & Trust

Freight Costs

Order & Delivery Lead Times

Counterfeit Drugs
HUB to HUB Partnerships are key to enabling network agility, optimization and automation.

Connect ONCE to the Network

Private IT Networks

Each party connects 1 time to the network and cross references internal systems to their own HUB not to each partners master data.

Suppliers Enterprise IT Systems

Enterprise IT Systems

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HUB to HUB Partnerships are key to enabling network agility, optimization and automation.

Multi-Party Permissions, Workflows and Multi-Party Execution are uniquely enabled by One Network’s Architecture.
CoC Must Support Multiple Compliance Requirements - USA DSCSA, EU FMD, GxP, ...

*50+ Countries have published compliance requirements for Medicines and Other products*

- **ONE** Supports the key GMP requirements as well as the following for enabling **DSCSA compliance**:
  - Ability to generate and manage serial numbers
  - Exchange serial numbers and events with packaging sites and carrier systems
  - Track serialized inventory operations across **manufacturing, warehouse, global and domestic logistics operations, returns and recalls**
  - Automatically trigger compliance activities including notifications, receipts, and exceptions so that daily operations remain compliant

**DSCSA Key Points** - The following are the major provisions of the [Drug Supply Chain Security Act (DSCSA)](https://www.fda.gov/drugs/about-fda/). These provisions apply to manufacturers, repackers, wholesale distributors, dispensers, and third-party logistics providers as noted below:

- **Product identification**: Manufacturers and repackers to put a unique product identifier on certain prescription drug packages, for example, using a bar code that can be easily read electronically
  - **ONE** can generate a barcode for packages. However, we won’t support all kinds of barcode format like EAN-128 (based on GS1) but we can support specific format as part of implementation

- **Product tracing**: Manufacturers, wholesaler drug distributors, repackers, and many dispensers (primarily pharmacies) in the drug supply chain to provide information about a drug and who handled it each time it is sold in the U.S. market
  - **ONE** - Supported as mentioned above. We are also building GS1 EPCIS event API for any of these parties to provide events in standard EPCIS format

- **Product verification**: Manufacturers, wholesaler drug distributors, repackers, and many dispensers (primarily pharmacies) to establish systems and processes to be able to verify the product identifier on certain prescription drug packages
  - **ONE** - Supported as mentioned above. We are also supporting EPCIS query API in addition to our native API for events that can be used for verification

- **Detection and response**: Manufacturers, wholesaler drug distributors, repackers, and many dispensers (primarily pharmacies) to quarantine and promptly investigate a drug that has been identified as suspect, meaning that it may be counterfeit, unapproved, or potentially dangerous
  - **ONE** auto detects certain suspicious conditions like unknown location and re-introduction. We can further expand such exception detection workflows as plug-ins to our Exception framework (as needed)

- **Notification**: Manufacturers, wholesaler drug distributors, repackers, and many dispensers (primarily pharmacies) to establish systems and processes to notify FDA and other stakeholders if an illegitimate drug is found.
  - **ONE** - This is implemented with each deployment

- **Wholesaler licensing**: Wholesale drug distributors to report their licensing status and contact information to FDA. This information will then be made available in a public database.
  - **ONE** – This service is being added to the Health care core stack

- **Third-party logistics provider licensing**: Third-party logistics providers, those who provide storage and logistical operations related to drug distribution, to obtain a state or federal license.
  - **ONE** - 3PL or Forwarder is one of the parties in CoC solution handling their part of supply chain
CoC – Key IoT, Supply Chain and Logistics Data Dimensions

- Carriers, Shippers, 3PL, 4PL
- Parcel, LTL, FTL, Container, Road, Rail, Ocean, Air, Customs Brokers
- On Network Logistics Execution
- Route Plans & Scheduled Stops
- Vehicle Events (Speeding, Engine On/Off, Temperature, Driver identification)
- Dispatching from Carriers

- Telematics Networks & GPS Aggregators
- Direct Connect to EDL Networks
- Carrier Mobile Applications

- Global & Domestic Transport Network
- Environmental Conditions
- High Resolution Weather Visibility
- Weather Forecast Visibility
- Temperature, Vibration, Orientation, IoT data feeds

- Geo Fencing
- Site and Geo Fence Capture from Shippers
- Geocode sites accurately to Address level.
- Admin by Shippers for Fence Drawing

- Site Appointment Schedule Visibility
- Live vs. Drop Appointments - Hourly Updates
- Inventory Visibility
- Receiving & Put away visibility
- Pick, Pack, Ship Operations
- Yard & X-Dock Visibility
- Gate in – out visibility

- Traffic Visibility
- Current Traffic Visibility
- Historic Traffic Patterns
- Predicted Traffic

- Order + Shipment Tracking
- Order + Shipment
- Shipment + Package
- Serialized Package Tracking
- Serialized Item Tracking
- Hierarchical Package Tracking

- Order + Shipment + Package Tracking
- Production & Inventory Visibility
- Receiving & Put away visibility
- Pick, Pack, Ship Operations
- Yard & X-Dock Visibility
- Gate in – out visibility

- Milestone Tracking
- Raw Events to Logical Events
- At Site, Departed, Arrived, ...

- Warehouse & Mfg Visibility
- Port Visibility
- Container Status Visibility
- Customs Status
- Import / Export Issue Tracking

✓ Continuous ETA Calculations
✓ Smart Alerting
✓ Reason for Delay Root Cause Visibility
✓ Track and Trace with Recall

Accurate ETAs to Milestones, Sites and Final Destination across multi modal routes

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End to End Serialized & Chain of Custody Tracking

Manufacturing

Transportation & Distribution

Sales & Delivery
Mfg & WHS Serialized Asset Tracking Requires Processing and Understanding of Lot and Batch Transactions, Order, Shipment, Package and Container Transactions

- Transfer of Custody
- Title Change
- Move
- Put-away, Pick
- Pack/Unpack/Repack
- Lot Split
- Cut
- Lot Combine
  - Lot Blend
  - Lot Discrete Mix
  - Lot/Serial Mechanical Assembly
- Testing – Ex. Spectral Analysis

- Lot Instances and Serialized Items can traverse any sequence of chain-of-custody primitives
- Provenance can be tracked through all CoC primitives

- Make
- Re-introduction
- Location Tracking
- IOT Sensor data
- Inspect
- Certify
- Repair
- Sealed
- Broken Seal
Hierarchical Continuous Shipment, Package and Item Tracking
Forecast, Orders, Shipments linked to Containers, Packages, Lots, Serialized Items

Carrier, Shipment, Orders, Lane, Vessel ID, Speed, GPS Location, Ship From, Ship To, ETA, ...

Container, Container ID, Shipment, Orders, Dimensions, Contents, Location, ...

Package, Shipment, Order, Serial Number, Documentation, Package Contents, ...

Sub-package, shipment, orders, serial number, items, ETA, etc...

Lot, Serialized Items, Qty, Weight, ...
A NETWORK OF NETWORKS

REAL TIME VALUE NETWORK

Retail Networks

High Tech Networks

Healthcare Networks

External Environment Networks

ONE NETWORK TRADING COMMUNITY

Suppliers

CARRIERS

BUYERS

GPS

GLOBAL LOGISTICS GATEWAY

Telematics Networks

INDEPENDENT NETWORKS

INDEPENDENT TRADING PARTNERS

GLOBAL TRADE NETWORK

LAST MILE NETWORK

Systems

YOU

ERP / Oracle / SAP / etc.

SHIPPERS

CARRIERS

BUYERS

Weather

Traffic

Disease Breakouts...
International Logistics

Global Suppliers

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<td>Export DC</td>
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<tr>
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<td>Domestic Suppliers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2</th>
<th>Prepaid</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Collect</td>
</tr>
</tbody>
</table>

**Global Network & Tracking**

- Collaboration platform for Supplier, Buyer, LSPs, Freight Forwarders and LLPs.
- Integrated process flows between cross border and in-country operations.
- Network with 22 Ocean Lines and 6000+ LSPs across the globe.
- Support for Air and Ocean EDI integration for booking and tracking.
- Item Level capture of Container Contents along with Orders & Shipments.

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70+ Telematics Providers on the Network

Carriers can manage their credentials and configuration with ELD Provider

Carrier can authorize ELD data to shippers on a per-Shipper basis

➢ Real-time Track and Trace
➢ Asset Tracking
➢ Real-time GPS Events
➢ Geofencing
➢ NEO Computed Events
   ➢ Arrival
   ➢ Departure
   ➢ Unscheduled Stop
   ➢ Delay at Customer Site
   ➢ Continuous ETA

ALS ELD
Apollo ELD
Azuga
BigRoad
Blue Tree
BlueInk
Carma Sys
Clear Path GPS
CloudELD
Compliance Now
DigitalFleet
Easy Log
ELD Fleet
ELD Vendor
EROAD
Elogz
Fleet Complete
Fleet Complete
FleetFreedom
Fleetilla Connect
FleetManager
Fleetmatics
FleetRover
FleetUp
FleetWave
Getab
Gorilla Safety
GPS Insight
GPS TraceIT
HCSS Elog
HOS 247 ELD
Hutch ELD
IAASC inControl
In Touch ELD
Integrity ELD
InteleLogs
JJ Keller
KeeptruckIn
LB Tech HOS
LB Technology
Linxup
LoadTrek
Logbooks
m2mData Smart
Map Anything ELD
Master ELD
Matrackinc
Mobilewarrior
NexTraq
Omnitracs
Orbcomm
Pedigree
PeopleNet
PosiTrace
PowerFleet
Prim8
Rand Mc Nally
Roadside ELD
Samsara
SimpleElog
Simpletruck
Skybitz
Spireon
Stream Line
Swiss Log
Teletrac Navman Drive
Telogis
ThinAir
Titan GPS Logbook
tmeld
TND 760
Trackit
Transmission
Trimble
Trucker Path ELD
Zonar

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Last Mile Courier Delivery: Anonymous Courier Tracking

3PL Manages Courier Communication

Option 1) Courier Contracts
- Distributes Tracking app as part of contract

Option 2) On Demand Couriers
- Simple Anonymous QR Code Tracking App per usage

Incentives:
- Carrier: Tracking delivery time contractual
- Courier: Incentives, repeat business, delivery metric

Option 2) QR Code
- SPL/Depot Pick
- Transfer QR Code
  - Print QR Label
  - QR Cell Phone Xfer
- Courier QR & Package Handoff
- Track Location
- Update ETA
- Courier Delivery
- Customer Receipt
- Track Metrics – Rewards

Courier Points Awarded (Requires Courier to Register on the Network)
Serialized Asset Transaction & Event Tracking
Lot Transaction History | Hierarchical Serialized Tracking | Mix and Blend Tracking | Forward Genealogy | Backward Genealogy
Lot Blending | Discrete Lot Mixing | Serial/Lot Mechanical Assembly | Predicts Multi Tier ETA to Milestones and Sites

<table>
<thead>
<tr>
<th>Lot Instance: LOT1-VendorA-ITEM1-1</th>
<th>Lot Instance: 900000.RKT</th>
</tr>
</thead>
</table>

**Track**

- **Lot Instance:** LOT1-VendorA-ITEM1-1
  - 6a7d04... May 10, 2027 4:14 PM 529ea3... Current Position Changed Jan 18, 2018 8:45 AM
  - 99075bc... May 10, 2027 4:15 PM 493b05... Delivered Jan 19, 2018 10:36 AM
  - 8a58916... May 10, 2017 4:18 PM 07a3a2a... Assigned for Customs Check Jan 20, 2018 2:30 AM
  - 3768c36... May 10, 2018 4:18 PM ee22d56... Customs Check Completed Jan 21, 2018 4:30 AM
  - c8ca035... May 10, 2018 4:19 PM 1d68a48... Picked Up Jan 22, 2018 10:36 AM
  - 338a53e... May 10, 2019 4:19 PM cea53a9... Current Position Changed Jan 24, 2018 6:36 PM
  - 40751fd... May 10, 2018 4:19 PM koa301d... Current Position Changed Feb 05, 2018 1:36 PM
  - 7467a7... May 10, 2018 4:19 PM 30440b8... Current Position Changed Feb 15, 2018 1:36 PM

**Packing View**

- **Lot Instance:** 900000.RKT
  - **Serialized Item or Lot Instance:**
    - C098343
    - P87384734
    - S8712387
    - CP89378734
    - CP84325004
  - **Item:**
    - Comp3436
    - Comp3438
  - **Barcode:**
    - 1234067890
    - 1234067890
    - 1234067890
    - 1234067890
    - 1234067890

**Lot Details**

- **LOT1-VendorA-ITEM1-1**
  - Influenza Vaccine 5mL Vial
- **LOT1-VendorA-ITEM1-1FLU STRAIN A/(MICHIGAN)-LOT3**
  - Influenza Vaccine 5mL Vial
- **LOT1-VendorA-ITEM1-1FLU STRAIN A/(MICHIGAN)-LOT5**
  - Influenza Vaccine 5mL Vial
- **LOT1-VendorA-ITEM1-1FLU STRAIN B/(BRISBANE)-LOT2**
  - Influenza Vaccine 5mL Vial
Hierarchical Operations on Serialized Assets

TRACK THROUGH CONSOLIDATION/DECONSOLIDATION

TIED INTO BROADER SUPPLY CHAIN Business Objects
- Serialized Tracking
- Package & Lot-Based
  - Splitting with Individualized Histories
- Targeted Recalls
FULL FAN-IN/FAN-OUT & GLOBAL SUPPORT
Asset Itinerary

Chain Of Custody

Lot Instance: LOT1-VendorA-ITEM1-1

Countries

- China
  - Exit
    - Jan 22
    - 10:36 AM
- United States
  - Entry
    - Feb 18
    - 3:36 PM
  - Exceptions
Intransit IoT Data Stream

High Volume High Speed Data Collection and Processing IoT INTEGRATION
Linked to location, asset state and providence
Multi Party Permissions allows control of precisely who can see what. For example, to allow customers to see their predicted order delivery dates and predicted late deliveries or for OEMs to see demand across the network for just their products and services, etc...
Serialized Asset Pedigree

Chain Of Custody

Latest View  Lot Instance: LOT1-VendorA-ITEM1-1

LOT1-VendorA-ITEM1-1  ACTIVE

Latest Information
Beijing, China  Feb 20  2:30 AM
Customs inspection of LOT1-VendorA-ITEM1-1 failed. Missing import documentation.

Item Type
Influenza Vaccine 5mL Vial
Influenza vaccines, also known as flu shots, are vaccines that protect against infection by Influenza viruses. A new version of the vaccine is developed twice a year, as the Influenza virus rapidly changes.

- Manufacturing Date: Nov 29, 2018
- Expiration Date: May 01, 2019
- Lot: LOT1

Weight:
Volume:
Temperature: 0 Fahrenheit (F)
Pressure:
Business Transactions Tracked against each Asset
Business Transactions Tracked against each Asset
### Exception Detection, Tracking and Issue Resolution for each Asset

#### Lot Instance: LOT1-VendorA-ITEM1-1

<table>
<thead>
<tr>
<th>Exception No.</th>
<th>Audit Type</th>
<th>Event Type</th>
<th>Event Date</th>
<th>Actioned By</th>
</tr>
</thead>
<tbody>
<tr>
<td>9126</td>
<td>IOT Violation</td>
<td>Current Position Changed</td>
<td>May 10, 2027</td>
<td>SYSTEM</td>
</tr>
<tr>
<td>9092</td>
<td>Unknown Location</td>
<td>Current Position Changed</td>
<td>May 10, 2027</td>
<td>SYSTEM</td>
</tr>
<tr>
<td>9017</td>
<td>IOT Violation</td>
<td>Current Position Changed</td>
<td>May 10, 2027</td>
<td>SYSTEM</td>
</tr>
</tbody>
</table>

#### Description:
- Temperature: 78°F violated as threshold values are...
- Location: ClientA-Dallas DC
- Location: 35.1, -88.67 is 76% out of route. Threshold value is...
- Temperature: 78°F violated as threshold values are...
### New Recall

**Instant Recall – Asset Genealogy Search available to Any party on the network with permissions to search or recall**

- **Lot:**
- **Lot Instance:**
- **Item:**

**Show Multi-tier locations:**

- **RL-LOT1/CustomerA (CustomerA - CustomerA) - 3 Locations**

<table>
<thead>
<tr>
<th>Recallee</th>
<th>Location</th>
<th>Contact Name</th>
<th>Contact Phone</th>
<th>Contact Address</th>
<th>Contact Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>ClientA</td>
<td>Sherman, TX, US</td>
<td>Matthew Roy</td>
<td>1234567890</td>
<td>4055 Valley View, Suite# 400, Sherman, TX, 75452, US</td>
<td><a href="mailto:maildummy@onemapproduct.com">maildummy@onemapproduct.com</a></td>
</tr>
<tr>
<td>ClientA</td>
<td>Mineloa, TX, US</td>
<td>Jonathan Thomas</td>
<td>1234567890</td>
<td>4055 Valley View, Suite# 400, Mineloa, TX, 75773, US</td>
<td><a href="mailto:maildummy@onemapproduct.com">maildummy@onemapproduct.com</a></td>
</tr>
<tr>
<td>ClientA</td>
<td>Farmersville, TX, US</td>
<td>Julian Williams</td>
<td>1234567890</td>
<td>4055 Valley View, Suite# 400, Farmersville, TX, 75442, US</td>
<td><a href="mailto:maildummy@onemapproduct.com">maildummy@onemapproduct.com</a></td>
</tr>
</tbody>
</table>
Predict, Identify and Resolve Issues – Across Full Spectrum

For example: Intelligent agents predict ETAs, then spot issues and propose solutions.