



# Next Generation Digital Supply Chains

PPI Symposium (09 December 2020)



**CLOUDLEAF**

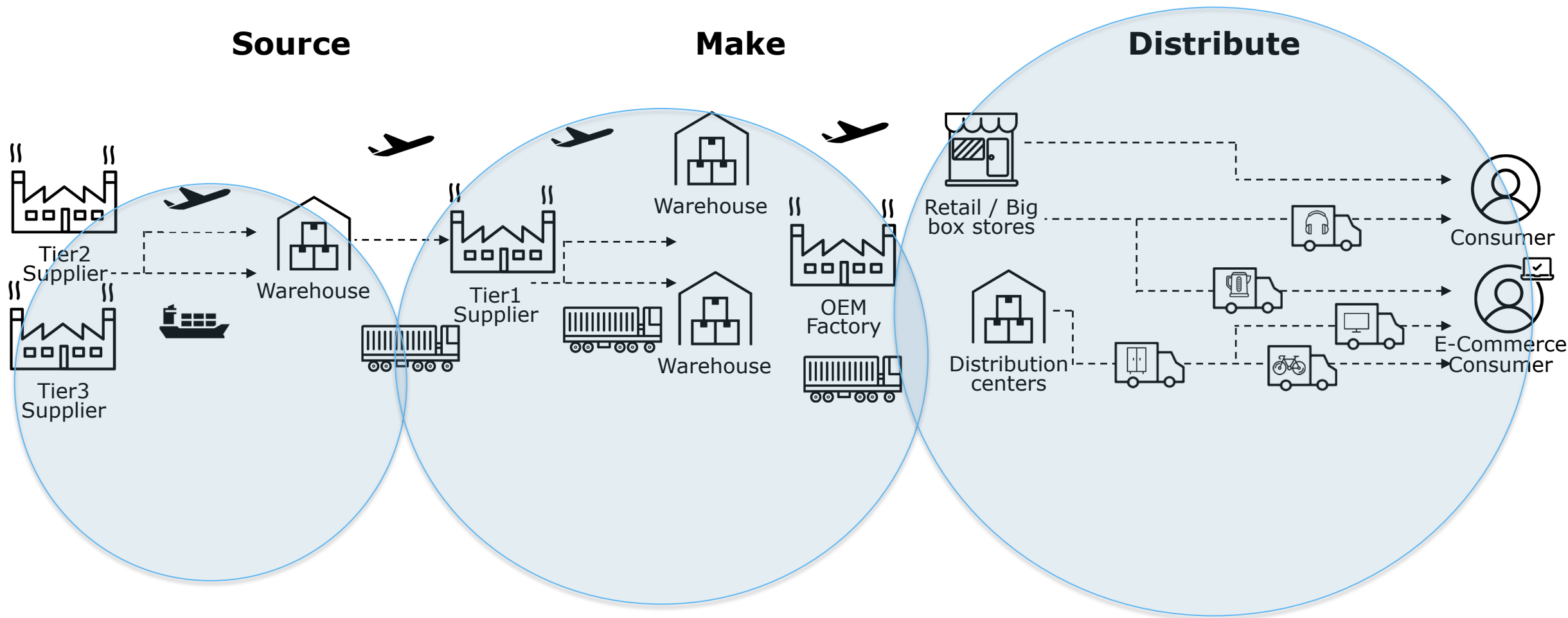
Cloudleaf Confidential and Proprietary



# Challenges



# Supply Chain Network



# Discrete Data and Visibility

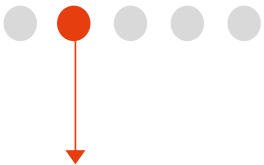


## Visibility Index of only 20%

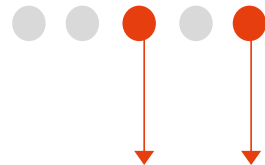
(Revenue/Profit Loss, Material loss, Compliance, Brand, Competition)



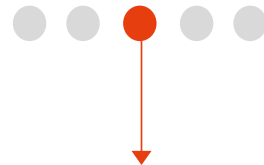
Suppliers



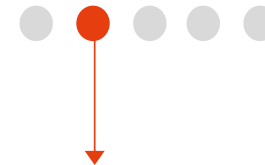
Factories



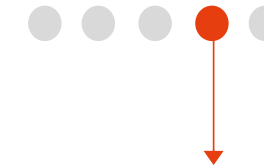
Distribution  
Centers



Customers



Market



Integrated business planning / S&OP



**What if visibility can be  
increased beyond 75%**



# Asset Intelligence

High value assets/tools moving between facilities



## Problem

**100K+**

Manufacturing  
Tools

**Millions (\$\$)**

In write downs

**Compliance**

Internal audit

Cloudleaf's solution increased the accuracy of their inventory tracking by monitoring the real-time condition and location of 32,000 pieces of heavy equipment that are spread across a dozen production plants in the US.

**100%**

Accurate counts

Remove  
**Manual  
Audit Process**

Efficiencies  
**Inventory  
Utilization**

## Result

**30K+**

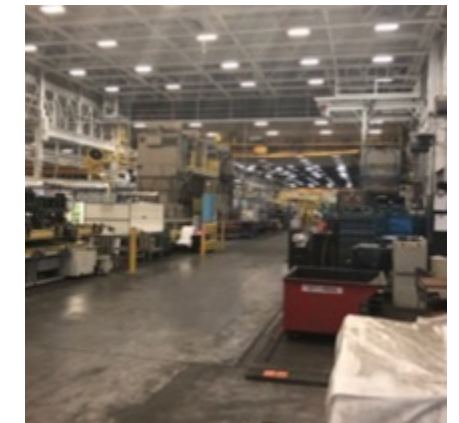
Manufactured  
tools deployed

**20X**

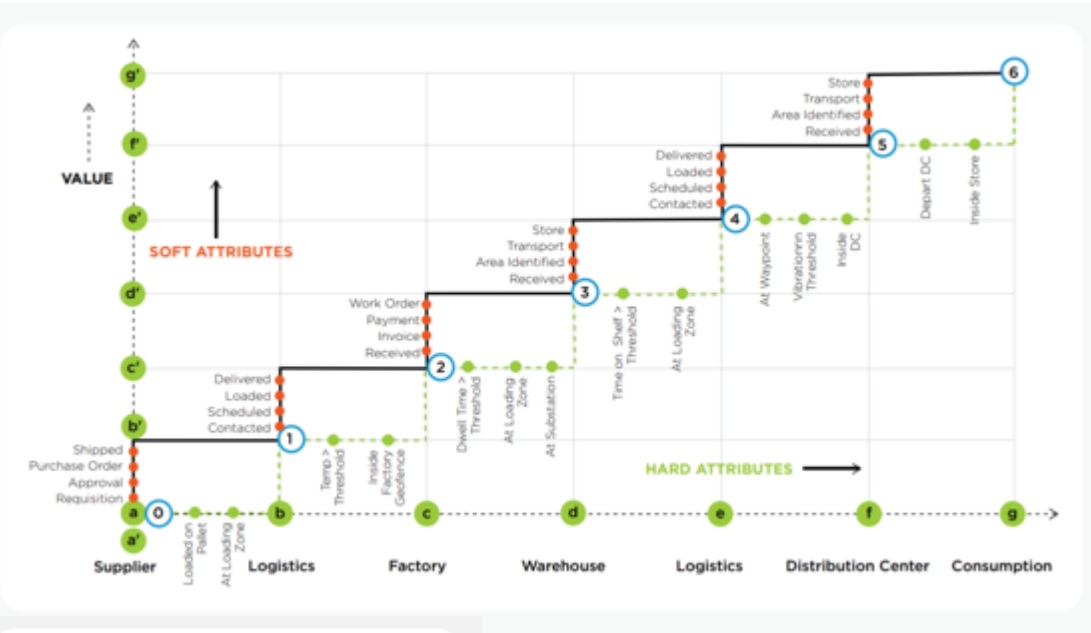
Return on  
Investment

CVI 20% to  
**100%**

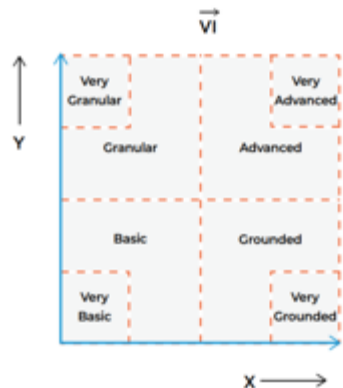
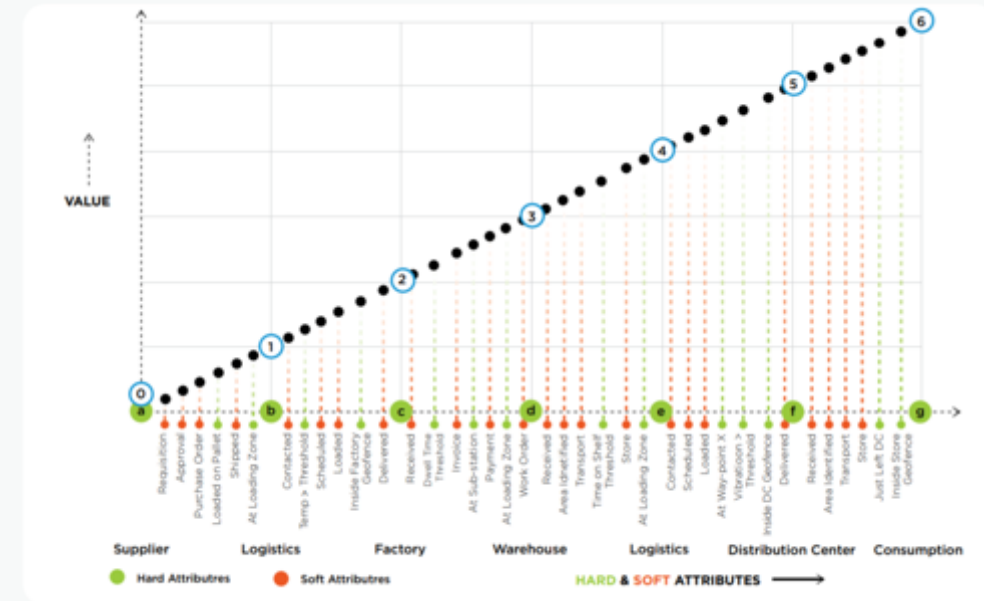
Visibility



# Framework To Quantify Visibility



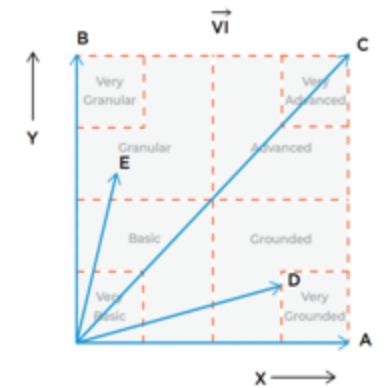
Continuous  
Visibility



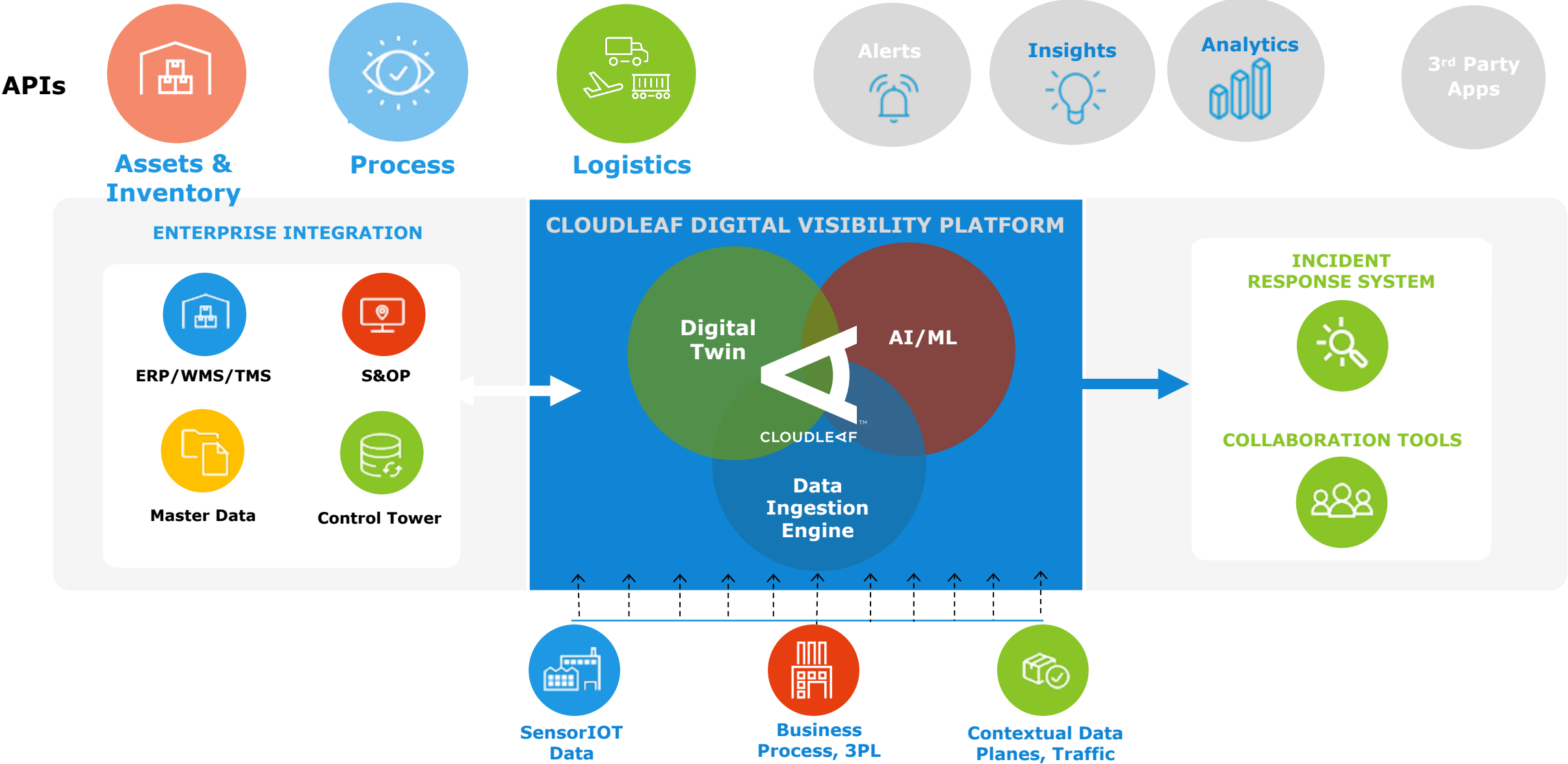
## Visibility Index:

- A measurable vector
- Combination of hard & soft attributes
- Seamless inter and intra org
- KPIs for org
- Framework for quantifying org maturity

Source: A Holistic Approach to Supply Chain Visibility, Prof. H.Lee, Dr. S. Paul, M. Veerina



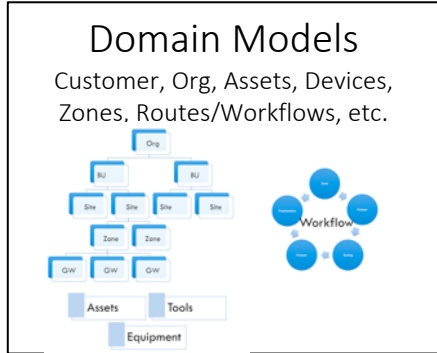
# Cloudleaf Digital Visibility Platform





# Supply Chain Digital Twin

## 1. Customer Domain Model



Set up

Customer Graph Model



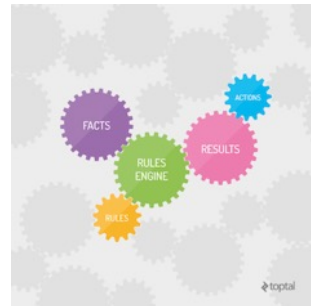
## 2. Business Rules

Supply Chain Graph

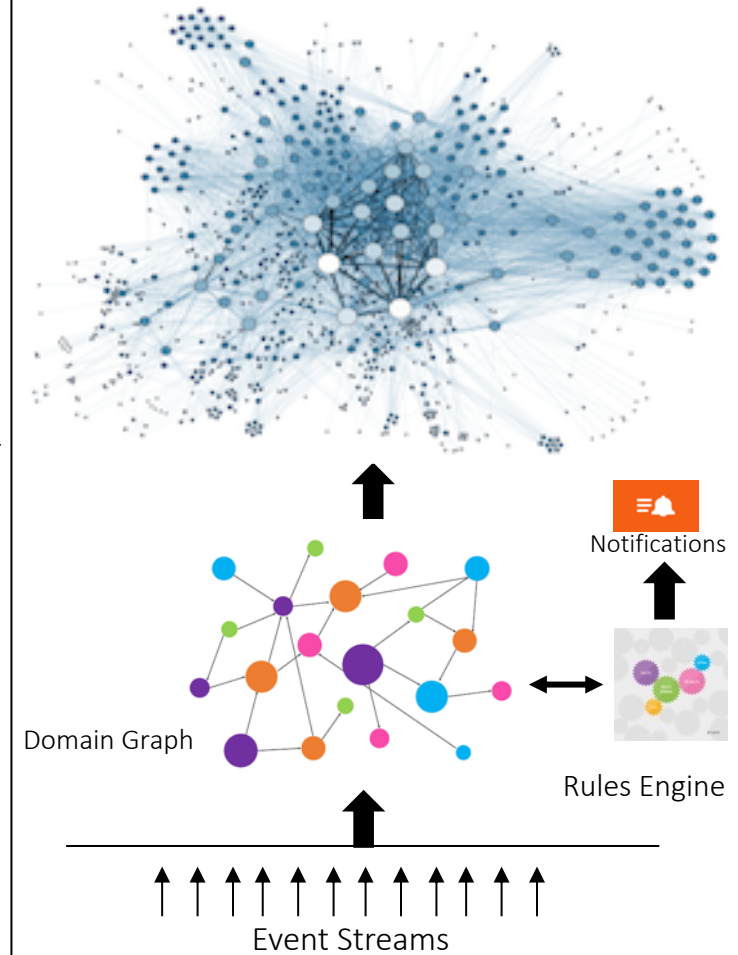


Business Rule Authoring

Business Rules



## 3. Live SC Knowledge Graph



- Master Data, Meta data
- State changes
- Event Injection
- Business rule evaluation
- Hyper-scale Graph DB
- Timeline views
- Zoom-in and out
- Visualization
- Routes with most excursions?
- Sites with most inventory?
- Distribution of specific vaccine lots?

# Device & Data Eco-system



- Sensor and hardware agnostics
- Pre-integrations to many 3<sup>rd</sup> party data sources
- Integrations to industry standard systems of record like ERP, WMS, TMS systems



# Actionable Predictive Insights



## CONTINUOUS VISIBILITY

Location, Movement, Path Data, Heat maps, Events

## REAL-TIME CONDITION

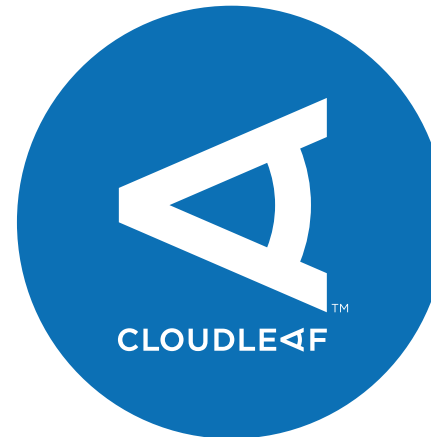
Environmental Data, Temp, Humidity, Shock, Vibration, Uptime, Downtime, Thresholds

## PRECISE UTILIZATION

Counts, Dwell, Aging, Cycle times, Velocity, Throughput

## PREDICTIVE, ACTIONABLE ANALYTICS

Leading indicators for infractions, ETAs, Trends, Forecasts, Patterns



## END-TO-END INTEGRATION

ERP, WMS, EAM Systems  
3rd party data  
3rd party device sensors

## COMPLIANCE TRACKING

Internal audit, Regulatory, SLAs, Track & Trace

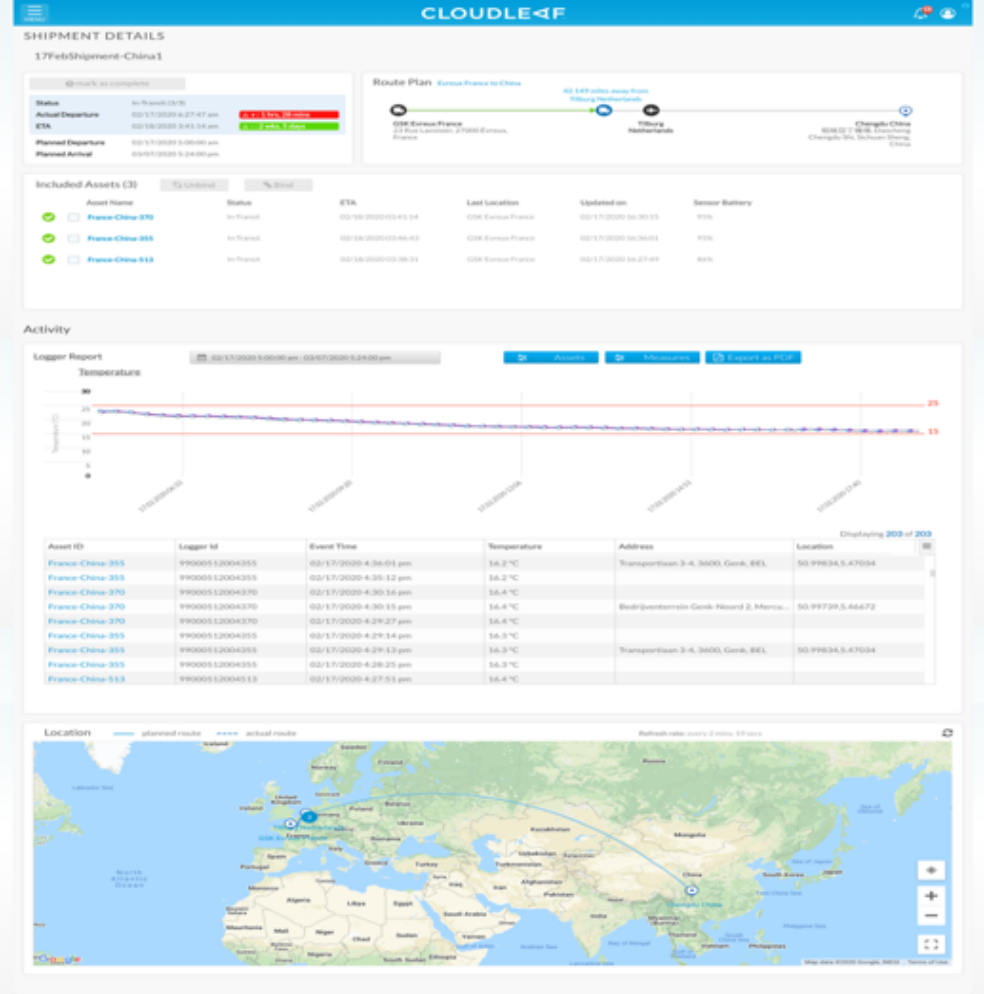
## ADVANCED KPI S/METRICS

Metrics defined from Business Rules, Actual vs. Plan

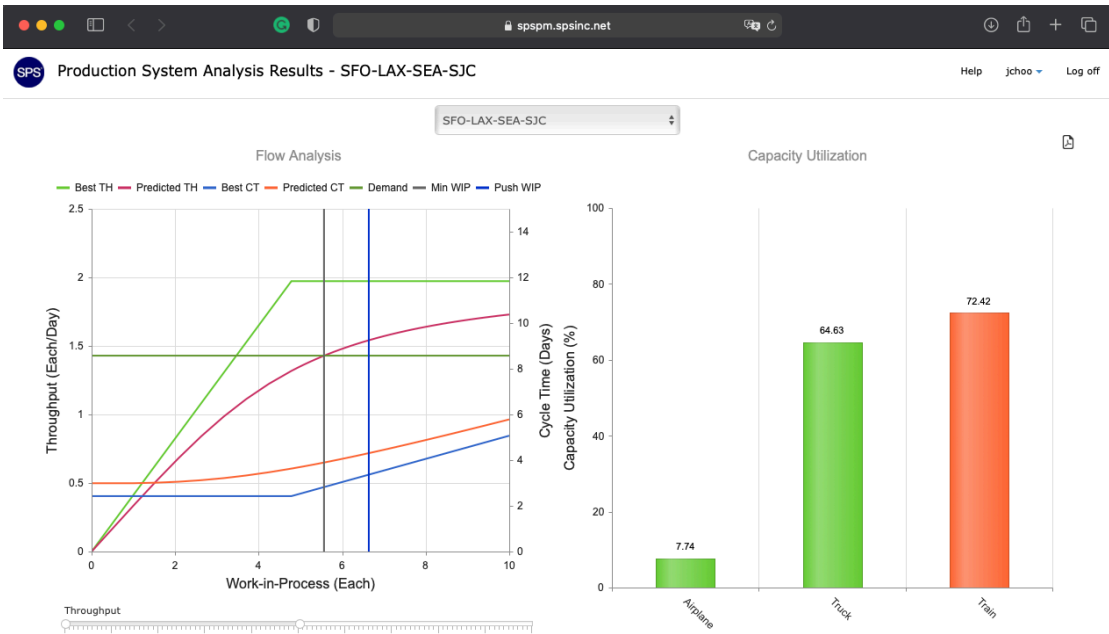
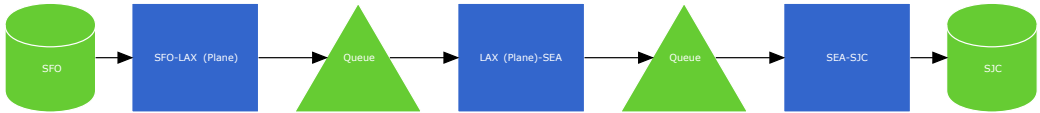
## EXCEPTION ALERTS

Actionable Alerts & Notifications, Failure rates, Process breakdowns

# Integration of Data Science and Operations Science



WIP Model,  
Signal APIs



Dynamic WIP  
Changes





**Thank you**