Lingaro Warehouse Operations Analytics

Power your digital Supply Chain with

Advanced Data Analytics

Supply Chain Analytics Practice

Presentation Structure

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General introduction to Lingaro

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Key Business Areas

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Business Challenges
Key Business Challenges in Warehousing related to the processes, labor, infrastructure, outsourcing and data analytics.

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Warehouse KPIs

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01

About Lingaro

Disruptive Innovator in Data and Analytics.

Worldwide Coverage

Worldwide Coverage Fortune 500 companies and global brands trust our expertise.

1400+

Lingarians as of June 2022

450+
solutions delivered

67
brought onboard since 2017

82+
enterprise customers and counting

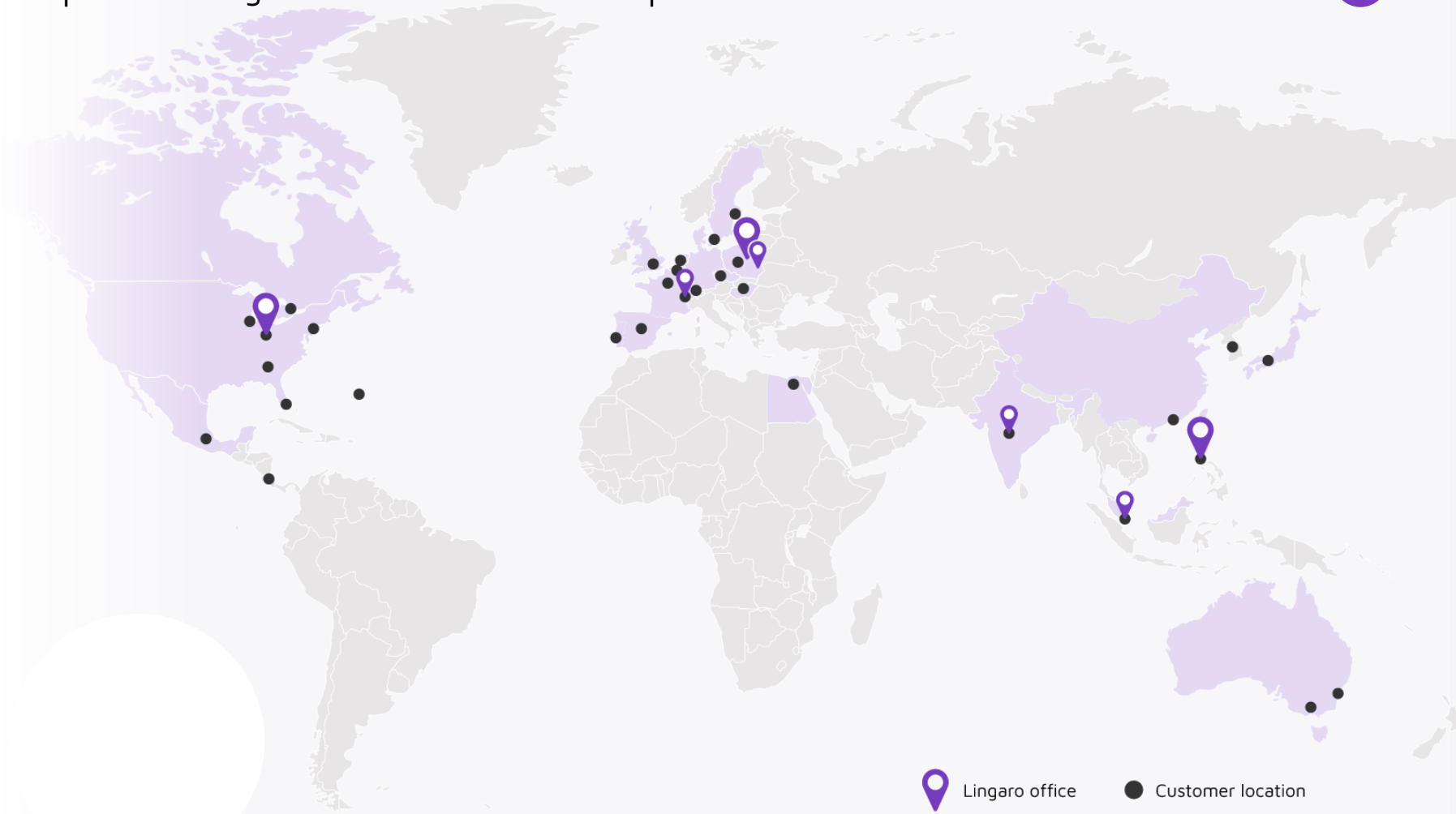
25
strategic partnerships with top technology providers

4.5/5
quarterly collaboration reviews

30+
nationalities

ISO 27001
certified

30%
Female workforce



Why Lingaro Supply Chain Analytics

Business expertise and technical knowledge
around global supply chains and using advanced analytics.

CPG & Pharma Experience
broad experience working with leading global CPG and Pharma companies.

Capacity
200+ analysts, data scientists, and developers in Lingaro's Supply Chain Analytics Team.

Digital transformation
perspectives on how supply chain optimization can drive organization-wide improvements.

Purpose-built tools
selected or developed in-house according to customer requirements.

Domain expertise
supporting custom software solutions meeting even the most niche requirements.

Fast project set-up
fast and efficient responding to Client requests with the project and team set up.

Proven methodology
following SCOR, APICS, and APQC guidelines.

02

Supply Chain Analytics

Our experts and areas of work.

How Lingaro SCA Practice can help

- Analyze **business processes** and find areas for improvement providing supply chain advisory.
- Map, collect and analyze **business requirements** in terms of technology implementation.
- Drive technical Teams on the business requirements for **successful implementation**.
- Drive data & analytics **innovations** in core supply chain management areas.

Our offerings

Consulting and Advisory

- Data Experience Strategy
- Data management strategy
- Enterprise Data Architecture
- Technology selection
- Cloud transformation

Design & Build

- Agile, Waterfall or Factory model
- Data Warehouse, Data Lake, Master Data Management and Big Data
- Data Catalogue, Data Science, Machine Learning & Chat Bots
- Visual analytics, Data Stories, Data Discovery, Custom Dashboards and Enterprise Reporting
- Custom Data Apps for Data Collection and Consumption

Managed Services & Data Operations

- Data Literacy – Adoption & Trainings
- DevOps, AIOps, MLOps & DataOps
- Managed Services
- Audit and Cloud governance
- Applications management

Frameworks and Solutions

- **Playbooks** – SCM, Consumer, Retail, Procurement, eCommerce, Sustainability, Sales & Marketing, HR, Finance and IoT
- Consumer Analytics Data Platform (CDAP)
- Insighter
- Data Analytics Accelerators
- Analytics Asset Hub & Reporting Factory
- AI for MDM

Clear Strategy

Solutions Tailored to Business Needs

Operational Excellence

Assets

We optimize business processes using algorithms

Data Science

- Advanced algorithms
- Data analysis and insights
- Computer Vision – Image & video recognition
- Documents and audio analysis

From raw data to actionable insights

Expertise in Supply Chain

Transportation & Warehousing
- Transportation Control Tower
- Cost Optimizer
- Productivity performance

Inventory Management
- Inventory Visibility
- SKU Optimization
- Inventory allocation

Demand Forecasting
- Demand forecasting tool
- Advanced reporting

Manufacturing
- OEE & Factory Productivity
- Manufacturing Costs and Product Standard Costing
- Production Schedule

Procurement
- Spend Management
- Supplier Performance
- Procure to Pay

Sustainability
- CO2 emissions reporting and optimization
- Raw and packaging materials monitoring

Expertise in Technology

Data Platforms

Generate Data
- IoT
- On-Premise Sources
- External Cloud Sources

Collect and Integrate Data
- ERP/TMS/ WMS/MES
- Data Lake
- Master Data Management

Analytical Solutions

Analyze Data
- Data Catalogue Business Models
- Data Science & Machine Learning

Derive Business Insights
- Tailor-made Dashboards
- Enterprise Reporting
- Visual Analytics & Data Discovery

Excellence in Supply Chain Analytics Offering

Demand Forecasting

- Sales forecasting
- Demand forecasting & planning
- Advanced reporting layer for demand forecasting
- Data integration and onboarding with the existing forecasting engine

Design Supply Chain

- Logistics Network Modelling
- Distribution Network Modelling
- Transportation Network Modelling

Manufacturing

- OEE & Factory Productivity
- Maintenance Optimization & MRO Management
- Manufacturing Costs and Product Standard Costing
- Production Schedule Analysis
- Manufacturing Capacity Monitoring

Sustainability

- CO2 Emission Reporting
- Energy Consumption Reporting
- Sustainable Warehouse

Inventory Management

- Inventory Visibility
- Unproductive Inventory Optimization
- SKU Optimization
- Dynamic/Real-time inventory

Transport Operations Analytics

- Logistics Control Tower
- OTD dashboard
- Transportation Cost Analyzer
- Transport utilization and maintenance

Warehouse Operations Analytics

- Process mining for pallet lifecycle
- Zoning/Slotting App
- Performance Dashboard
- RPA for Warehousing

03

Business challenges

Warehouse Operations Analytics

Warehouse Business Challenges

Lack of real time visibility

- Warehouses can generate a lot of data while executing different processes. While this data can be too large to manage and analyze manually, it holds valuable insight for improving warehouse productivity and making it more efficient.
- Tracking goods movement through the supply chain, managing logistics operations, multiple delivery channels, and dealing with the returned or damaged products can be a demanding task for warehouse managers.

Labor management

- Labor costs can comprise nearly 65% of the total warehouse budget. Laborers are an integral part of the warehouse and managing them effectively can improve the overall productivity of different warehouse processes.
- Warehouse managers have to make important decisions for getting the most out of the available workforce. They have to find areas where automated systems can pitch in to reduce labor costs and make the order fulfillment process more efficient.

Capacity management

- A poorly configured warehouse can cause challenges in inventory management for the warehouse manager. The average warehouse capacity utilization is only 68% proving that warehouse spaces are not being utilized efficiently. With an optimal layout, warehouses can utilize their floor and vertical space better to store as many products as possible.
- Warehouse setup mistakes can also lead to unnecessary time wastage in searching for high frequency and fast-moving items.

3PL Warehousing

- For many businesses, agility has become the key. Agility demands that all functions and processes of an organisation, as well as the insights generated, are visible through the entire cycle.
- But logistics operations are complex, which presents several challenges for 3PL and must be overcome to induce this sentient quality in fragmented supply chains .

Systems & Data Sources

WMS Systems

ERP Systems

Equipment IoT Data

3rd party provided data

TMS Systems

Other Data & Systems

04

Warehouse Operations

Data Analytics
Selected dashboards
Business cases
KPIs – examples

Warehouse Operations Visibility

Key advantages

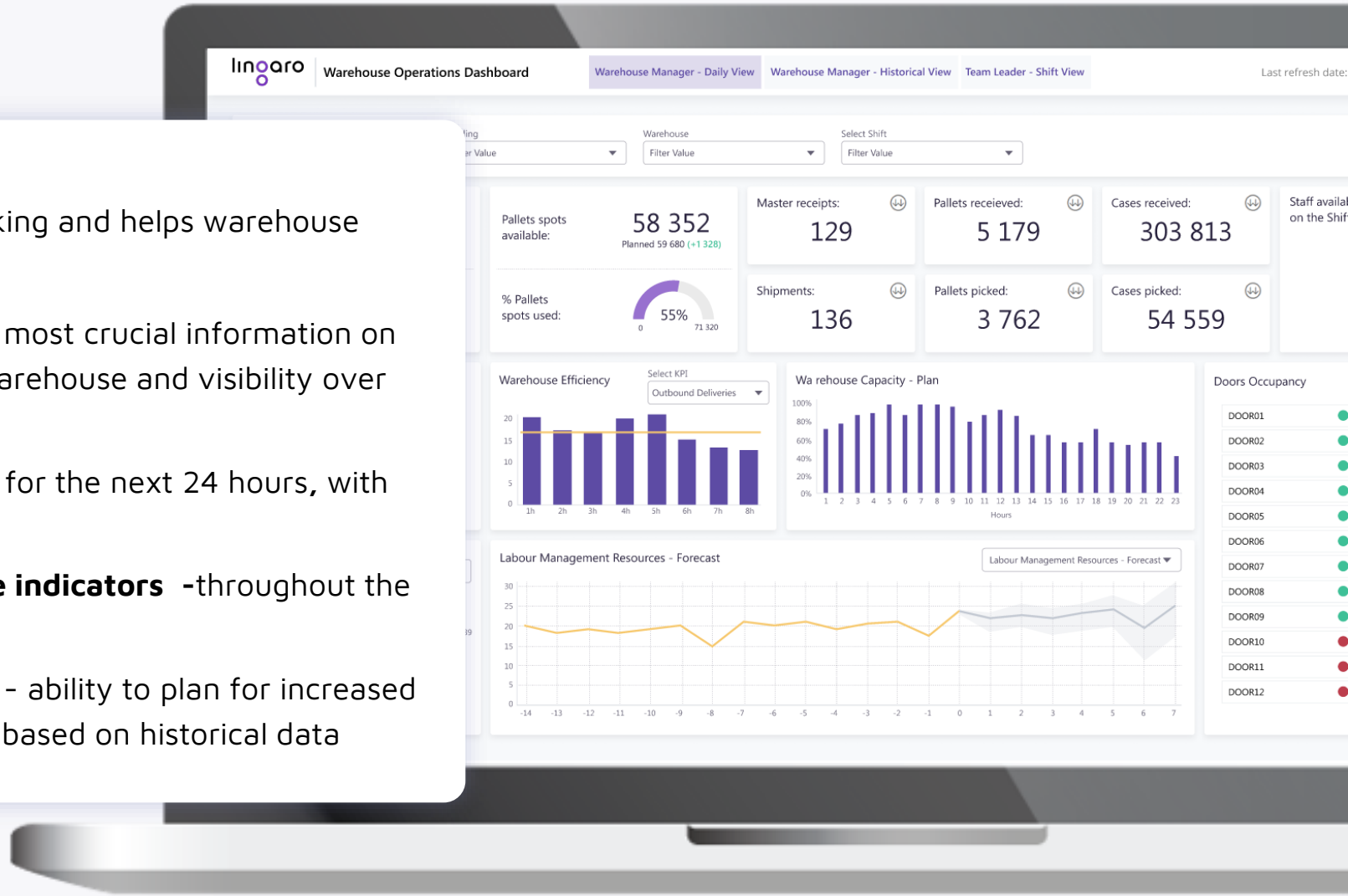
Analytical solution that facilitates decision making and helps warehouse operations to:

01 **Create daily work plan** – full set of the most crucial information on deliveries, shipments, capacity of the warehouse and visibility over the number of people on shift

02 **Prepare short term planning -** outlook for the next 24 hours, with perspective on next week operations

03 **Tracking most important performance indicators -**throughout the shift, with historical scope

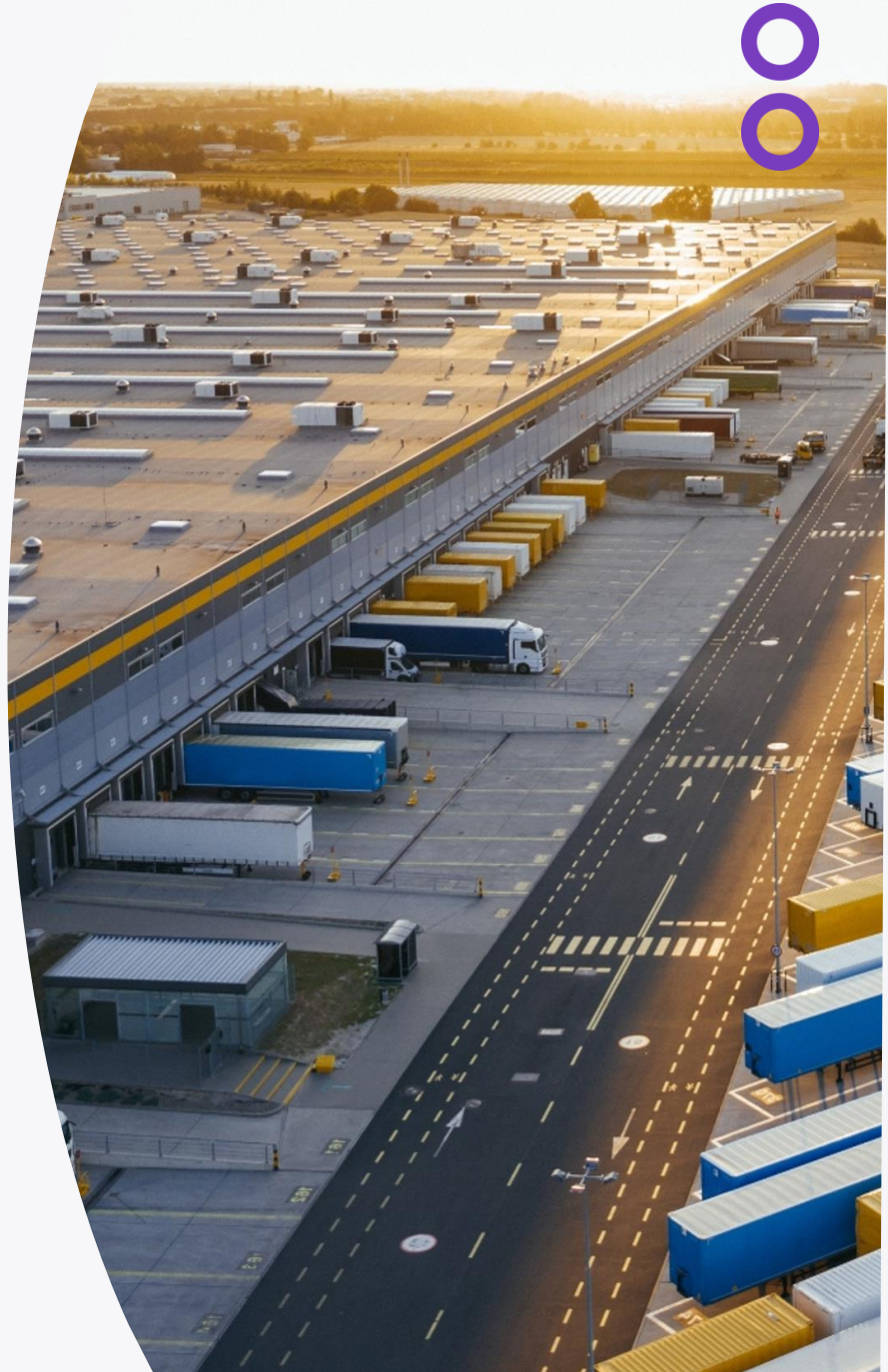
04 **Consider past trends with seasonality** - ability to plan for increased work intensity due to seasonal "events" based on historical data



Warehouse Operations Visibility

Benefits

- **React real time** to potential supply chain disruptions related to the higher/lower demand of inbound and outbound shipments in terms of capacity planning and operational management.
- **Improve productivity up to 5-8%** by analyzing pallet lifecycles in terms of receiving, put away, picking, staging and shipping activities.
- **Gain up to 8-20% of more capacity thanks to managing the workforce and assets effectively** by using capacity planning and operational insights in terms of work category, shift schedule, supervisor, etc., over by time frame.
- **Get global visibility for the warehouse operations** by collecting data insights and metrics available in seconds, incl. receiving, put away, storage, picking and distribution.



Labor management efficiency

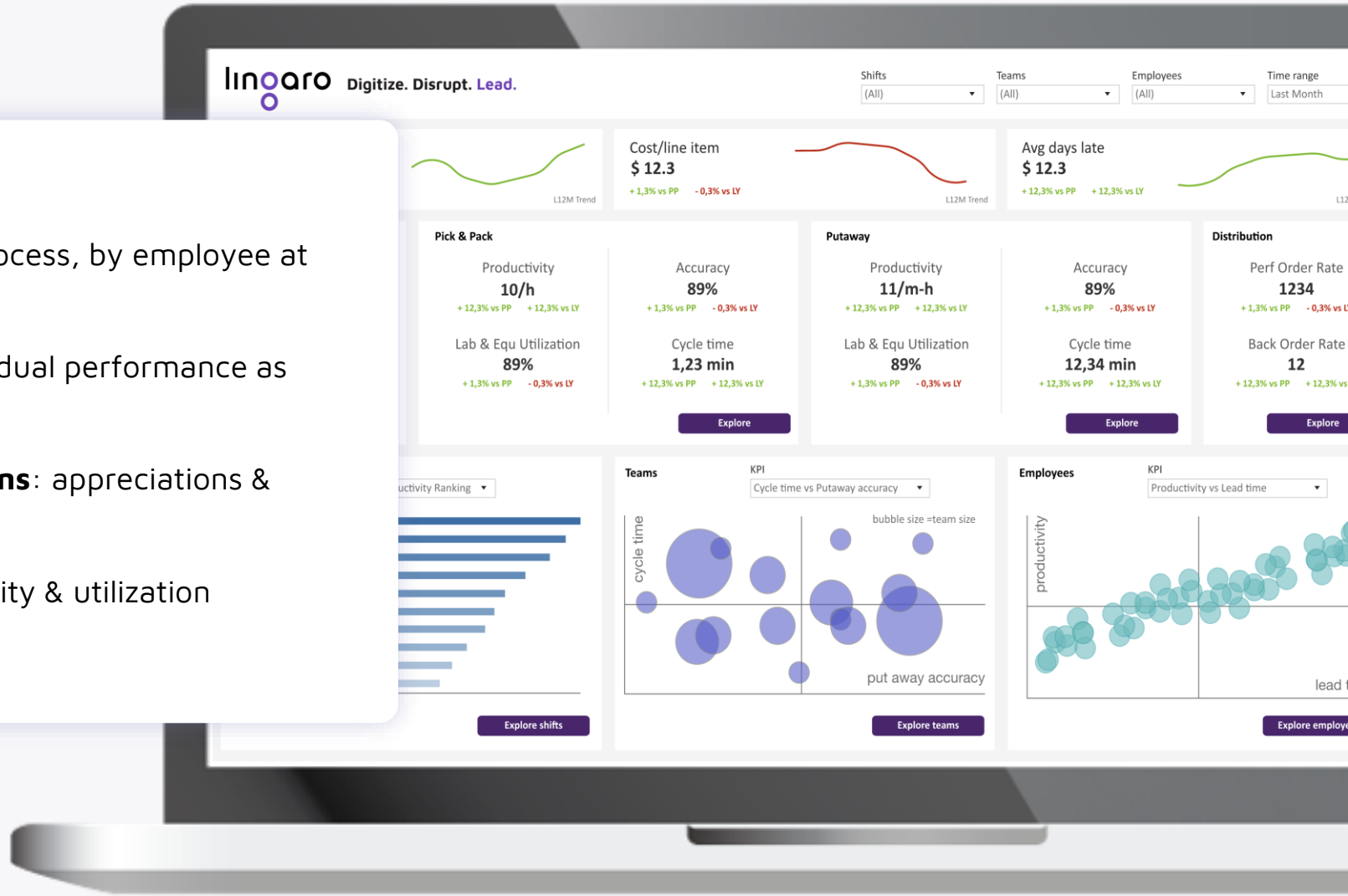
Key advantages

01 Proving **Visibility** of 100% tasks by process, by employee at any given point of time.

02 Managing **Labor Standards** of a individual performance as per real actions on ground.

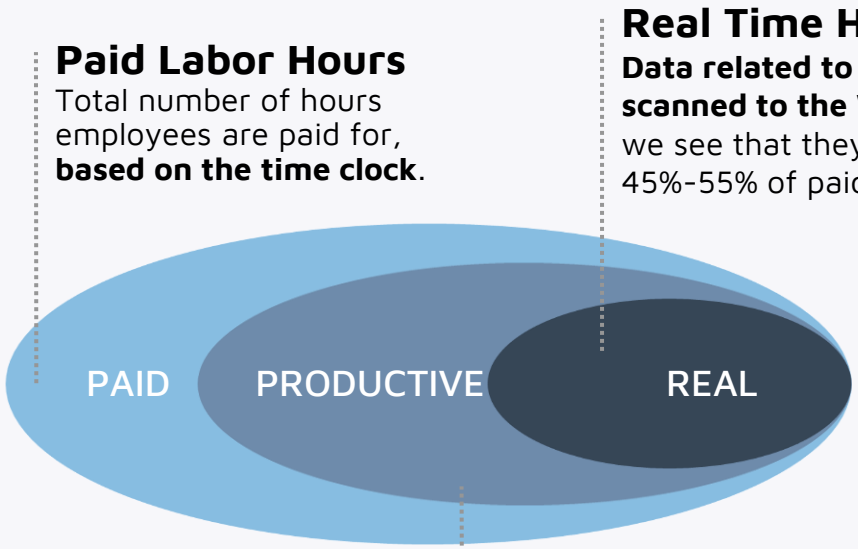
03 Taking appropriate **Supervisory Actions**: appreciations & rewards as per local labor councils

04 **Savings** thanks to increased productivity & utilization resulting in direct savings



Full visibility thanks to the time management

- Looking not only at **productive hours that are reported by the WMS tasks** but also **paid hours**, as another widening of the perspective solution.
- **Missing time** or **unproductive time** during the day – reduction of discrepancy between paid hours and total tracked hours as one of the key targets for optimization.
- Visualization of **indirect work** levels at both warehouse, team/department, and employee level, as input for business decisions.



Capacity management increase

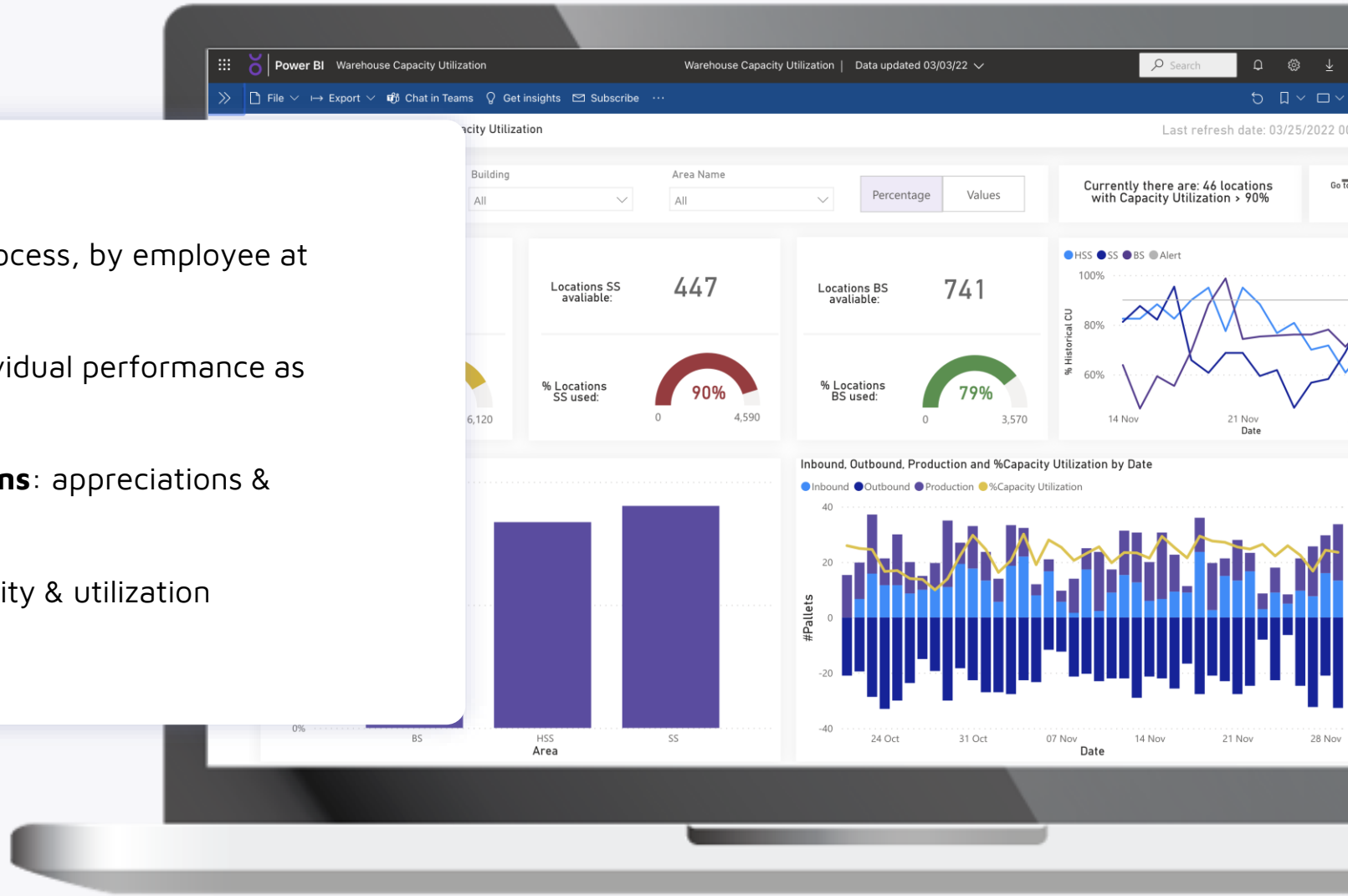
Key advantages

01 Proving **Visibility** of 100% tasks by process, by employee at any given point of time.

02 Managing **Labor Standards** of an individual performance as per real actions on ground.

03 Taking appropriate **Supervisory Actions**: appreciations & rewards as per local labor councils

04 **Savings** thanks to increased productivity & utilization resulting in direct savings

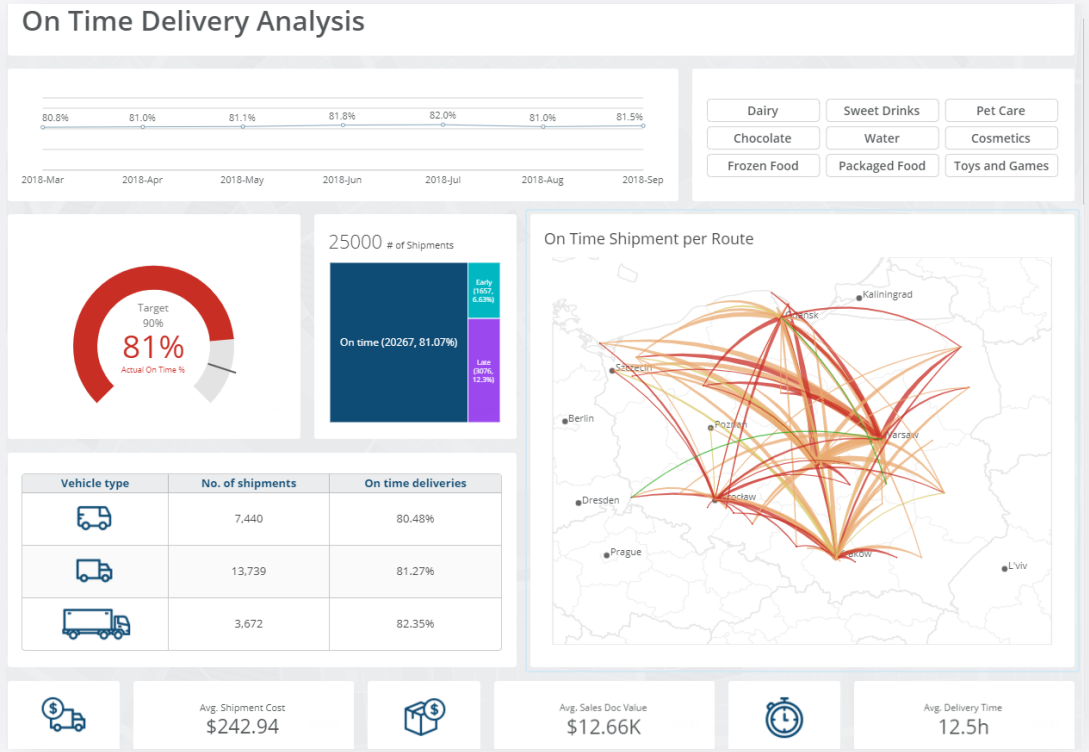


Selected sample areas to be measured using KPIs (1/2)

1. **Service / operations type**
- Warehousing
- Transportation

2. **Volume / profile / business characteristics**
- Units / cartons received to DC
- Units cartons shipped to customers
- Carton Fill Rate
- Complexity level (number of SKU per carton)

3. **Performance**
- On Time Delivery in Full (OTIF)
- Lead time / transit time
- Returns volume
- Picking accuracy / Stock accuracy



Selected sample areas to be measured using KPIs (2/2)

4. Financial

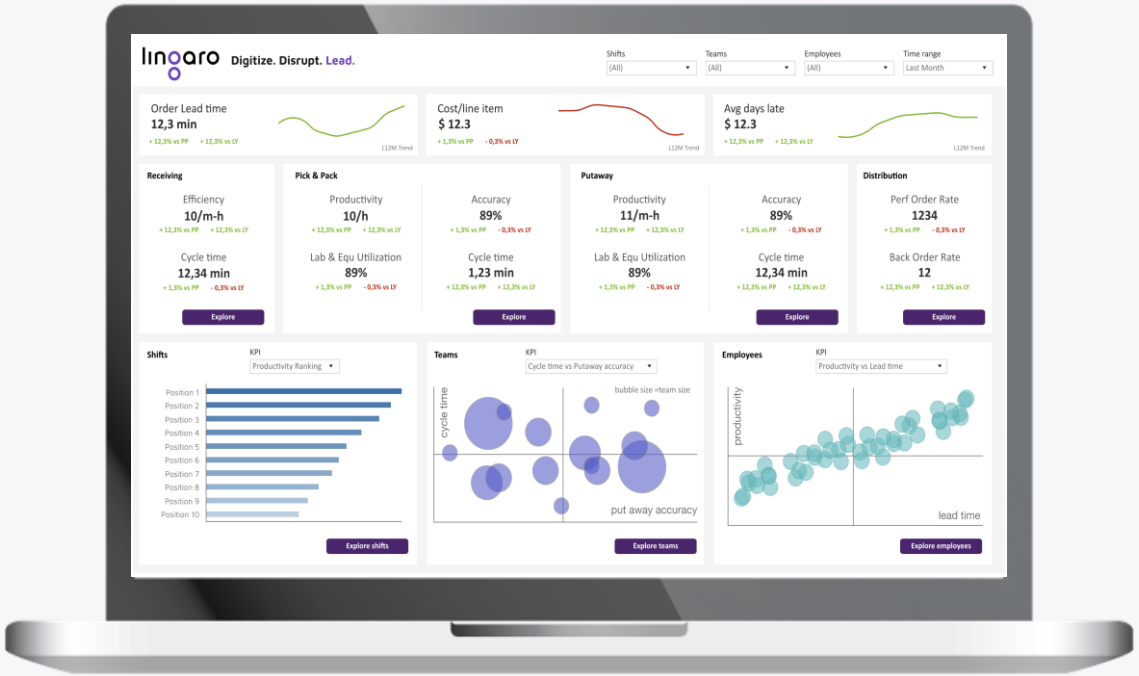
- Overall 3PL performance – bonus / malus system (sliding scale)
- Minimum Volume Commitment (MVC) and flexibility

5. Customer satisfaction / Claims handling

- Number of claims
- Amount claimed
- Claim processed time
- Damages level
- Customer Satisfaction level

6. Other

- Compliance with Service Level Agreement (SLA)
- Productivity year on year
- Improvement initiatives
- Carbon emission



Dashboard for analytics and data presentation in Power BI - benefits

Business

- Overall logistics cost reduction
- 3PLs performance improvement
- Support sales
- Increase customer satisfaction

Data

- Data quality improvement
- Full visibility
- Data available for analysis
- Bench-marking / comparison between 3PLs and sites
- Unique reporting system
- Possibility to simulate dynamic scenarios, monitoring and analyzing trends

05

Solution Architecture

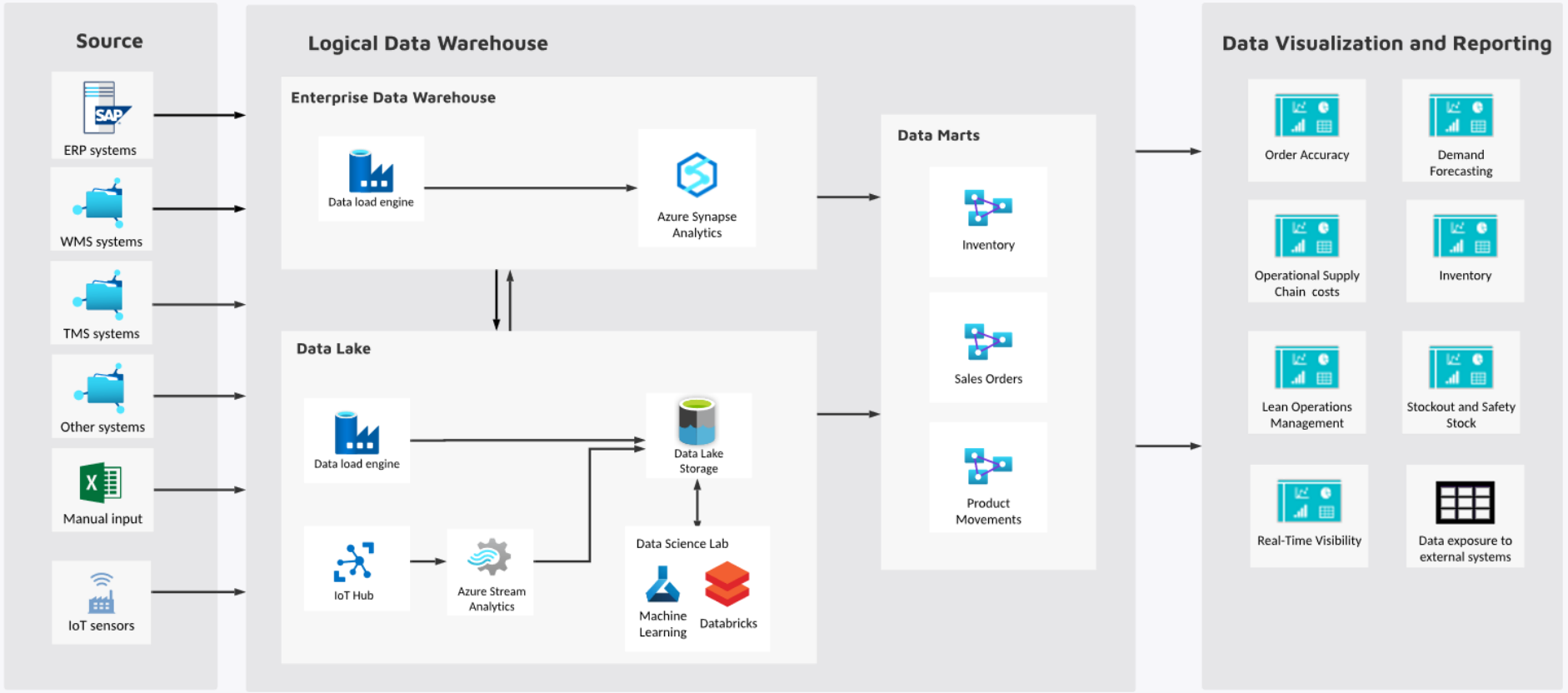
Providing data for your analytics

Solution Architecture

The Data Platform and Visualization based on Cloud technology

Key advantages of building a well-thought Solution Architecture:

- **Data mixing** – data coming from internal and external systems may be integrated thanks to access to ready-made integration technologies and techniques, prepared and analyzed in Azure.
- **IoT capabilities** – Azure cloud supports approaches to onboard and analyze data coming from the IoT devices.
- **Data Science** – enable access to the raw data to enable the Machine Learning and AI algorithms.



Data Integration scenarios

Batch processing

Azure Data Factory

Integrates all data using a **fully managed**, serverless data integration service.
It allows you to use over **90 built-in connectors** to visually integrate your data sources at no extra cost.
Ease of creating ETL and ELT processes without the need to write code, "Drag & Drop" in an **intuitive** environment or through your own code.

API integration

Azure API Management

Enables **deployment of the API** gateways side-by-side with the APIs hosted in Azure, other clouds, and on-premises, **optimizing** API traffic flow.
Meets security and compliance requirements while enjoying a unified management experience and **full observability** across all internal and external APIs.

Real-time processing

Azure IoT Hub

Enable **highly secure** and **reliable communication** between your Internet of Things (IoT) application and the devices it manages. Azure IoT Hub provides a cloud-hosted solution back end to connect virtually any device.
Extend your solution from the cloud to the edge with per-device authentication, built-in device management, and scaled provisioning.

Depth of the technical integration options

Access type	Source	Target	Connector	Additional tools	Use Case
Replication	ADLS, HD Insight, Databricks	BW/HANA	Direct Hadoop ODBC	SDI	• MS Azure can be used as a data refinery and later propagate cleansed and transformed data to SAP; • Building a common layer for data scientists (Data analysis on top of Big Data and SAP)
			Hive adapter	BODS	
			ODBC	N/A	
			VoraODBC	Data Intelligence, Vora	
	BW/HANA	ADLS, HD Insight, Databricks	VoraODBC	Data Intelligence, Vora	• MS Azure as cost-effective storage option for historical data; • To offload ETL jobs (Move ETL jobs to store, enrich and aggregate data in Data Lake); • Building a common layer for data scientists (Data analysis on top of MS Azure and SAP)
			File transfer via WebHDFS	OpenHubDestination	
			Direct Hadoop ODBC	SDI	
			Hive adapter	BODS	
			Spark	JDBC	
				SAP Dynamic Tiering	
Virtual Access	ADLS, HD Insight, Databricks	BW/HANA	Spark Controller	SDA	• HANA as accelerator for Big Data platform – identified long time running Hadoop queries to be run on SAP HANA; • Building a common layer for data scientists (Data analysis on top of MS Azure and SAP)
			VoraODBC	Data Intelligence, Vora	
			ODBC	N/A	
	BW/HANA	ADLS, HD Insight, Databricks	VoraODBC	Data Intelligence, Vora	• Building a common layer for data scientists (Data analysis on top of MS Azure and SAP)
			Spark	JDBC	
			Streaming	Data Intelligence, Kafka	• IoT data combined with SAP

Digitize. Disrupt. Lead.

Supply Chain Analytics Practice