



VAN METER



smart

SOLUTIONS SUMMIT

**DATA TO DECISIONS:
CREATE CONTEXT WITH
MANUFACTURING DATA**

WELCOME



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SMART MANUFACTURING IS POWERING A DATA EXPLOSION

Data generated by smart technology holds tremendous untapped value and possibilities

1. [Future of Industry Ecosystems: Shared Insights & Data | IDC Blog](#)

2. Rockwell Automation 9th Annual State of Smart Manufacturing Report

3. Rockwell Automation 9th Annual State of Smart Manufacturing Report

Connected IoT devices will generate 80 zettabytes of data yearly by 2025¹

Manufacturers with annual revenue less than \$500 million USD use only 38% of their data effectively²

95% of manufacturers are using or evaluating smart manufacturing technology³

CONTEXT FOR YOUR TEAMS



Cap Ex



Production Engineering



Data Science



Maintenance/Utilities



Front Line Operations



Quality



CI/ Innovation



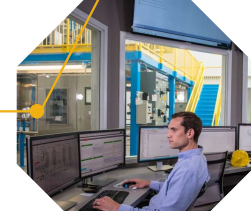
Product Development/ R&D



Production



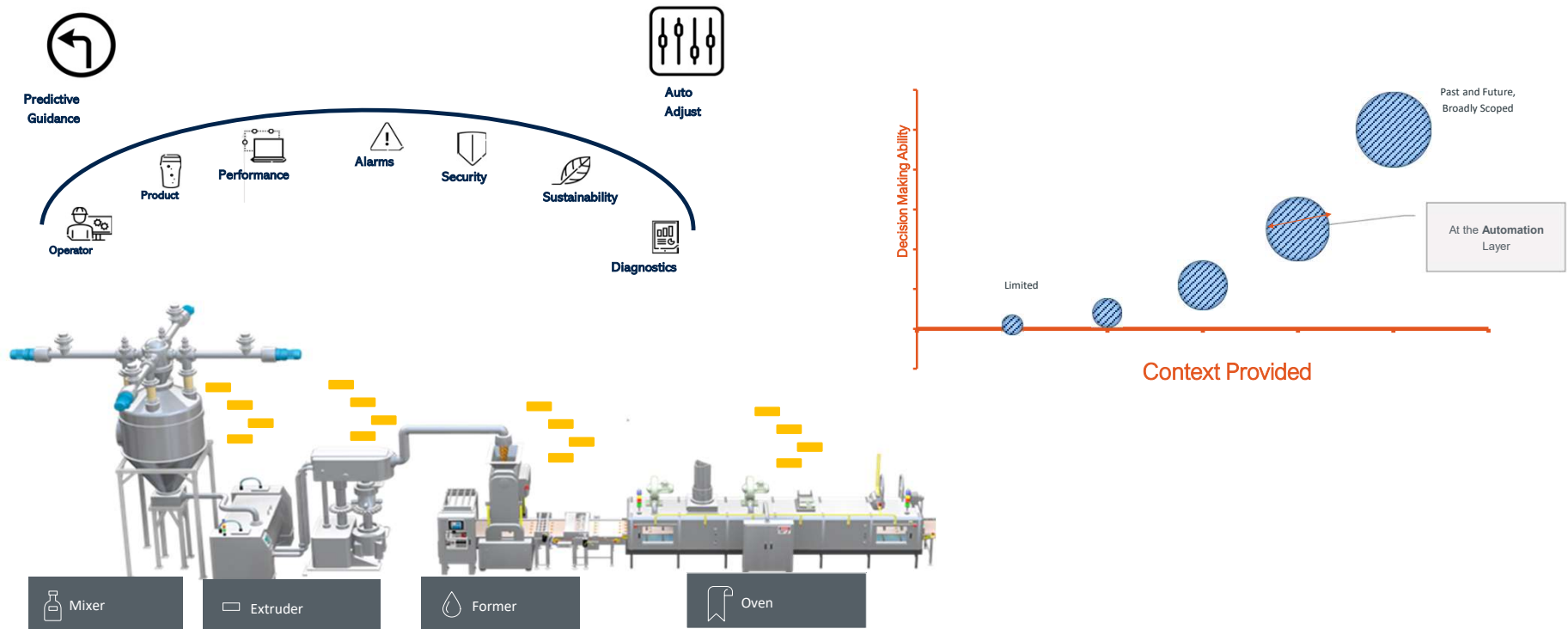
Supply Chain



Subject Matter Experts

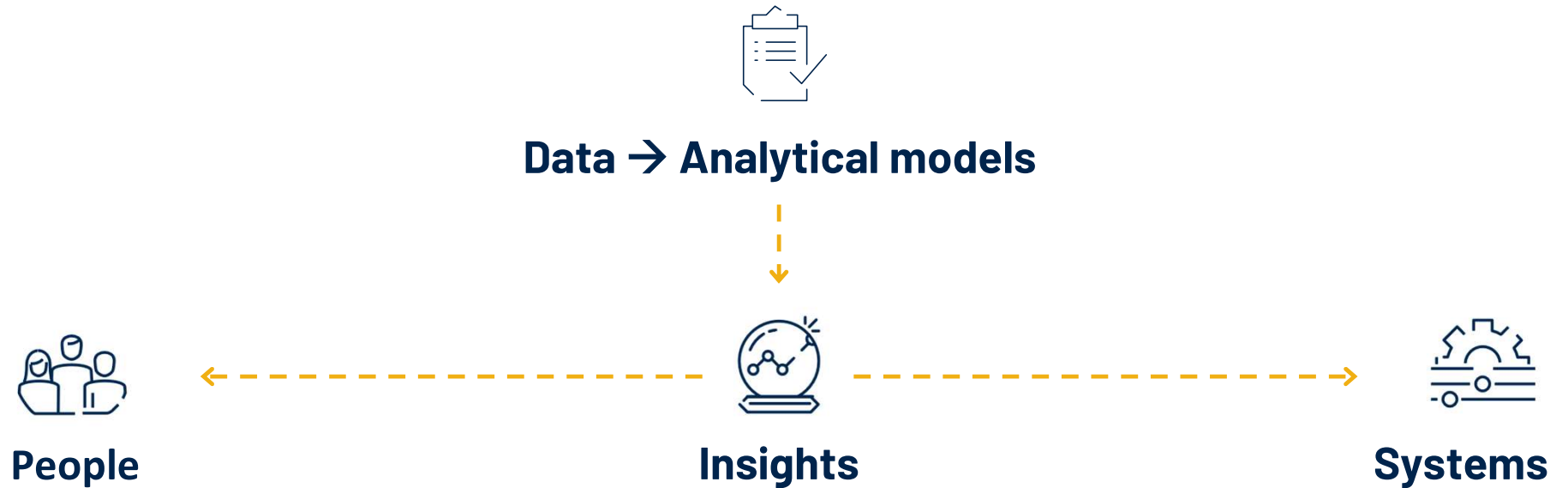
CONTEXT AT THE SOURCE

LEVERAGE AND DEVELOP COMMON INFORMATION MODELS.



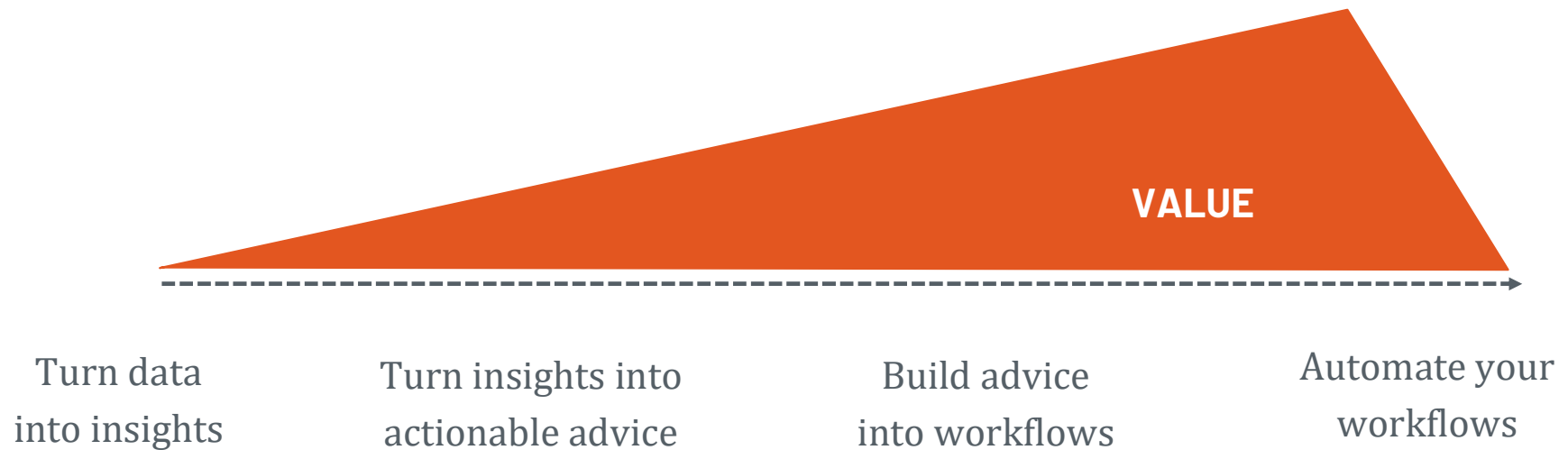
CONNECT PEOPLE AND SYSTEMS

WITH THE RIGHT INSIGHTS.

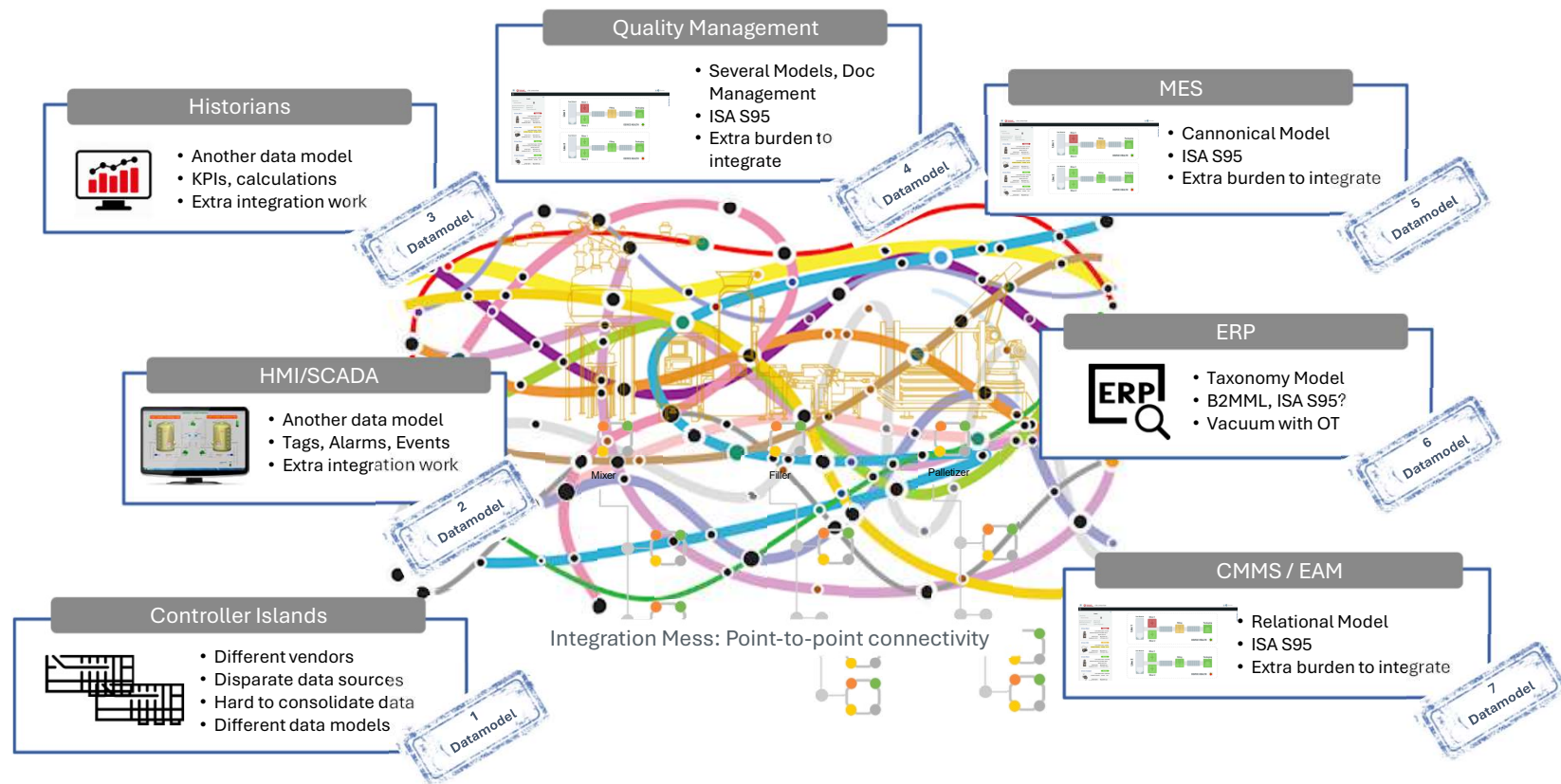


DIGITIZATION VALUE CONTINUUM

CREATING GREATER VALUE WITH DATA DRIVEN OPERATIONS.



INTEGRATION CHAOS ON MOST INDUSTRIES TODAY



CHALLENGES TO DATA-DRIVEN DIGITAL TRANSFORMATION

LACK OF OPEN, CONTEXTUALIZED, GOVERNED, SCALABLE DATA STRATEGY



DATA IN SILOS

IT, OT and ET (engineering) data live in silos and are difficult to use in combination



DATA LACKS CONTEXT

Data lacks context making it difficult to understand and use except by experts



DATA GOVERNANCE

Data is poor quality, untimely, with no owner and governance process, yielding untrusted insights



POINT SOLUTIONS

Point solutions are useful for solving individual pain points but don't make it easier to solve the next problem



SCALED DEPLOYMENTS

Scaling application deployments and repeatability of solutions across units, lines and sites is onerous and time consuming

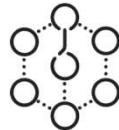
THE DATA JOURNEY

HAVING ACCESS TO YOUR DATA IS THE BEGINNING. PUTTING IT TO WORK FOR YOU IS THE NEXT STEP.



AVAILABLE

The fastest path to tapping into the value potential of digitalization in industry starts with getting the right data to the right user, with the right context, for the right problem, at the right time. **Connecting** to and **integrating** disparate data sets is not trivial.



MEANINGFUL

Data needs to be **cleaned**, **contextualized**, properly **governed** – and that's how data scientists spend most of their time. Automated pipelines can improve all three confirming data is ready for domain experts.



USEFUL

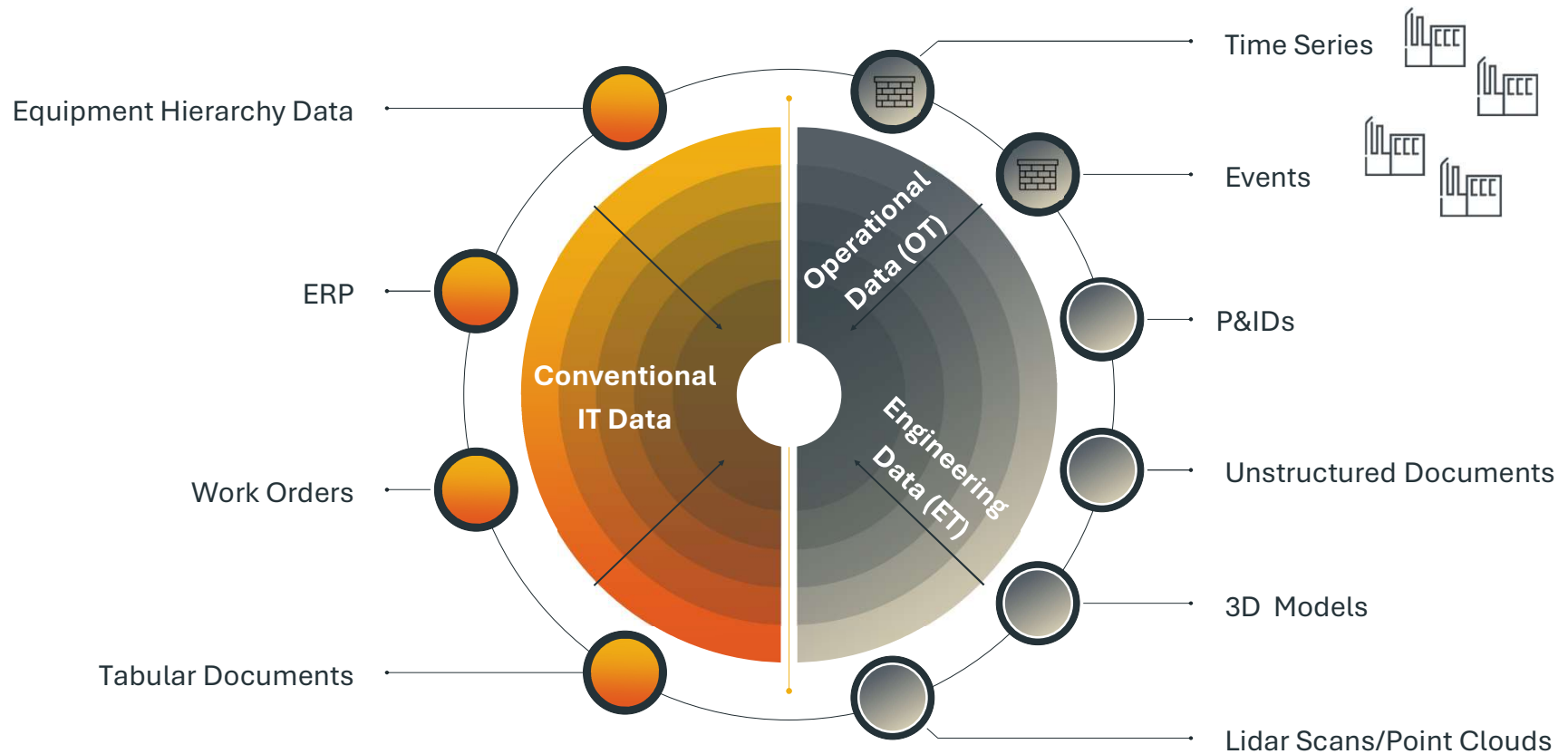
Industrial data becomes truly useful (read: fit for operational purpose) when it is integrated, contextualized and made securely available, **explorable** and actionable to all data consumers (**human and machine**) within and outside the industrial enterprise.



VALUABLE

Extracting maximum value from data relies on being able to apply advanced models to produce **insights** that inform optimal decision-making, empowering operators to **act** with confidence. This can be **ad-hoc** or defined and built applications.

DIFFERENT SOURCES OF IT, OT AND ET DATA



THINGS TO CONSIDER



Business objectives

Data sources

Data quality

Standardization

Scalability and flexibility

Structure of the Data

Data governance and security

User accessibility

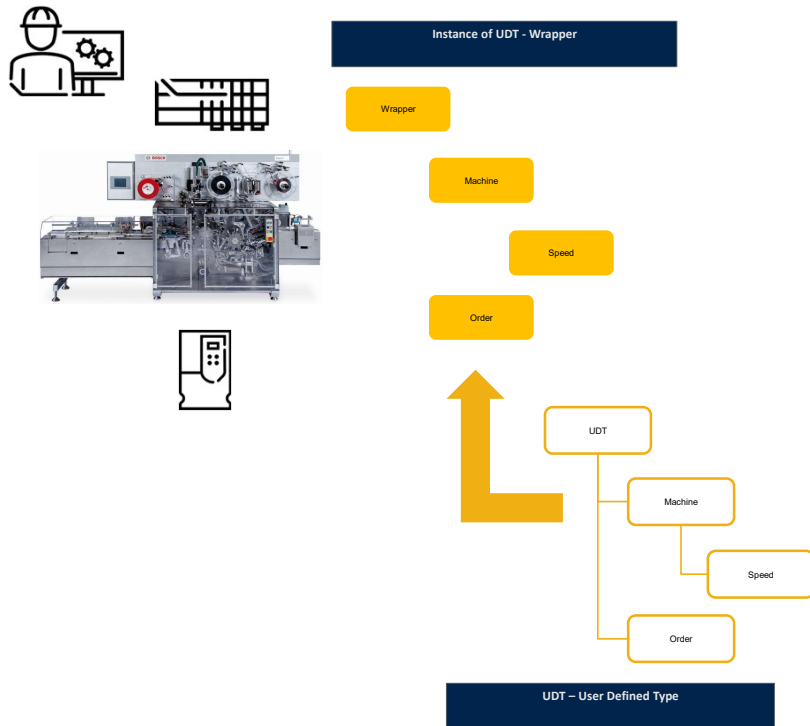
Performance quality

Documentation – source of truth

Systems and stakeholders

CONTEXT AT THE SOURCE - THE CONTROLLER.

STUDIO 5000 – DEVELOPING MODELS AT THE SOURCE



Logix Designer - CookieLine_v11_25_v32_EMU_S2 [Emulate 5570 32.11]

FILE EDIT VIEW SEARCH LOGIC COMMUNICATIONS TOOLS WINDOW HELP

Run Mode
Controller OK
Battery OK
I/O Not Present

Path: AB_VBP-1\2

Rem Run No Forces No Edits

Controller Organizer

- Controller CookieLine_v11_25_v32_EMU_S2
 - Controller Tags
 - Controller Fault Handler
 - Power-Up Handler
 - Tasks
 - Line
 - MainProgram
 - MainTask
 - Mixer
 - Depositor
 - Oven
 - Cooling
 - Loader
 - Wrapper
 - Parameters and Local Tags
 - Main
 - Fault
 - Alarms
 - El_Tracking
 - EnergyTransfer
 - Index_Seal
 - Interlocks
 - LineUpdate
 - Mode
 - Perform
 - PRNG
 - Reset

Mixer - Main Program Parameters and Local Tags - Mixer Program Parameters and Local Tags

Scope: Wrapper Show: All Tags

Name	Usage	Value	Force Ma
mInWrapperZone	Local	1	
mMachineUDT	Local	{...}	
▶ mMachineUDT.MachineID		'M1L1P12'	
▶ mMachineUDT.BatchID		'M1Mix--1789'	
▶ mMachineUDT.CPID		170726	
▶ mMachineUDT.CurrentCycleTime		60355	
▶ mMachineUDT.ProductCode		'--BUTTER--'	
▶ mMachineUDT.UnitPerMix		6	
▶ mMachineUDT.MachineStep		4	
mMachineUDT.MachineActive		1	
▶ mMachineUDT.MachineStepString		'Cut Index'	
mMachineUDT.Energy		1.0	
▶ mMachineUDT.Operator		'Jennifer M'	
▶ mMachineUDT.ProductID		3	
▶ mMachineUDT.Interlocks		1073741824	
▶ mMachineUDT.Infold		0	
mMachineUDT.ActualWeight		4.6811266	
mMachineUDT.VFDSpeed		45.0	
MODN	Local	38528.0	
mDef	Local	1	

Studio 5000 Logix Designer®

A DAY IN THE LIFE, FOR YOUR TEAMS



Cap Ex



Production Engineering



Data Science



Maintenance/Utilities



Front Line Operations



Quality



CI/ Innovation



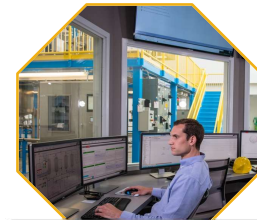
Product Development/ R&D



Production



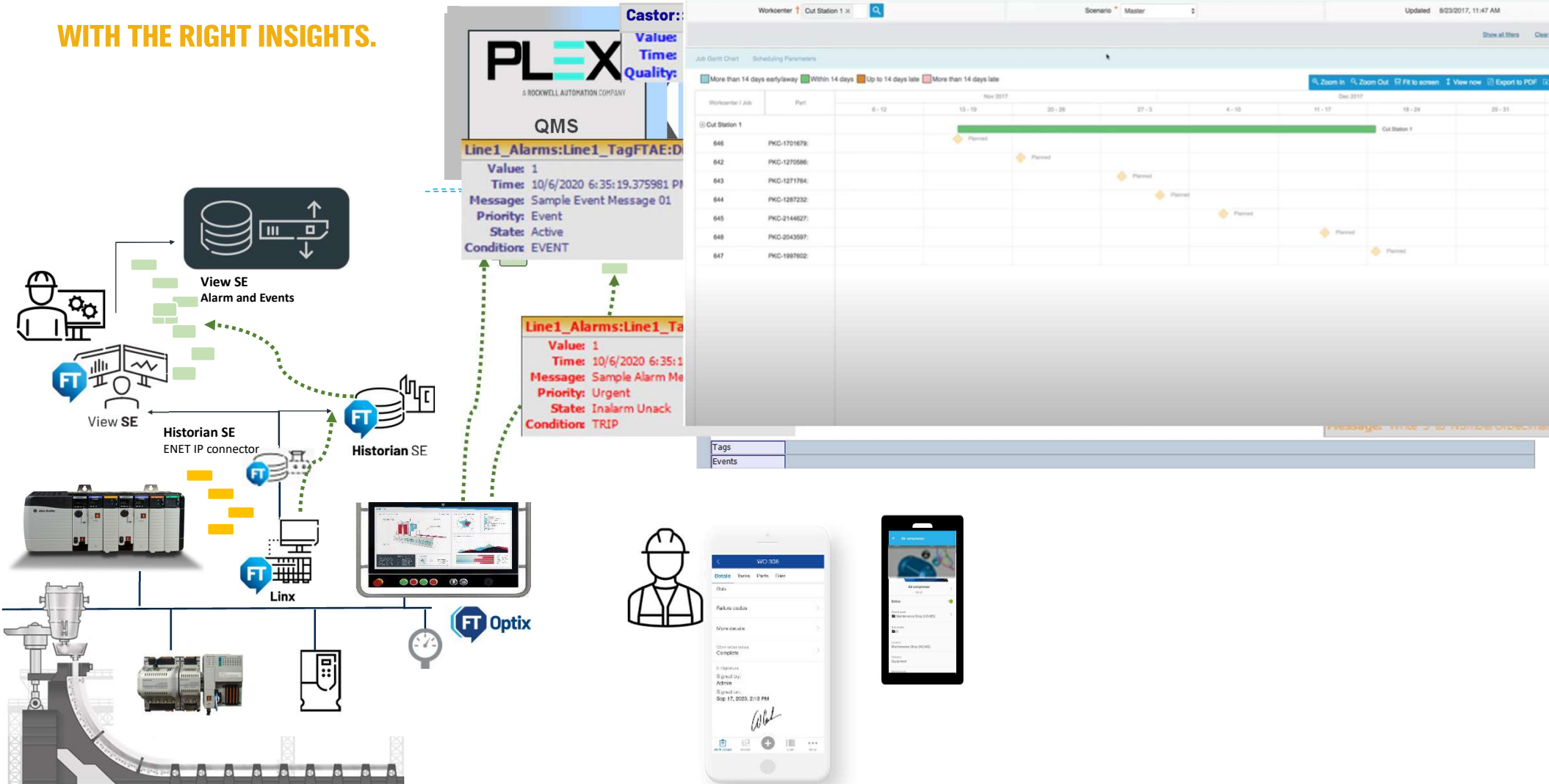
Supply Chain



Subject Matter Experts

LEVERAGING CONTEXT

WITH THE RIGHT INSIGHTS.



WHAT DOES THIS MEAN FOR...

ORGANIZING AND PREPARING DATA

EQUIPMENT PROVIDERS

- Designing data-ready machines
- Organizing and preparing data
- so that Equipment Providers can flexibly make decisions about use cases and applications

ANALYZING DATA AND TAKING ACTION

MANUFACTURERS

- Leveraging data to optimize productivity
- Leveraging a common model – single source of truth so that Manufacturers can flexibly make decisions about use cases and applications

INFORMATION FROM THE EDGE

WITH THE RIGHT INSIGHTS.

Data Ready

Make contextualized data and information available for egress, unlocking insights across a production line, site/or enterprise.

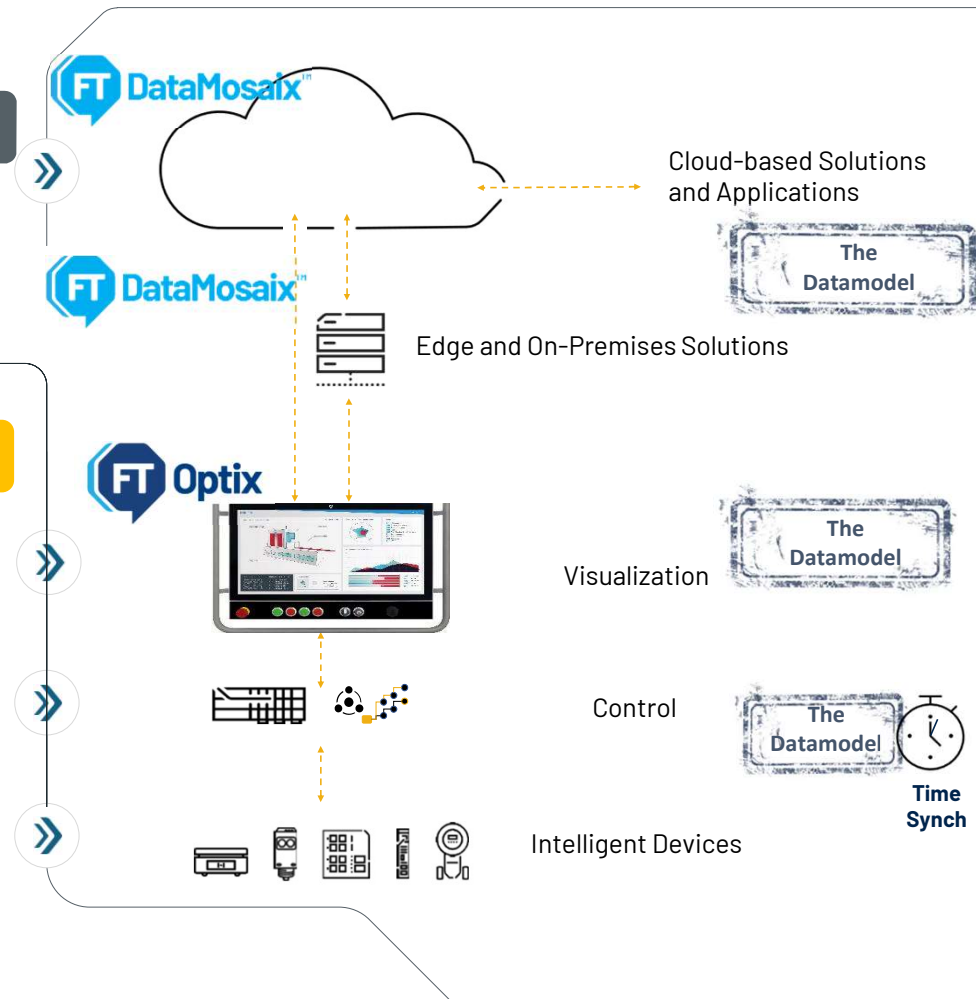


Smart Machine

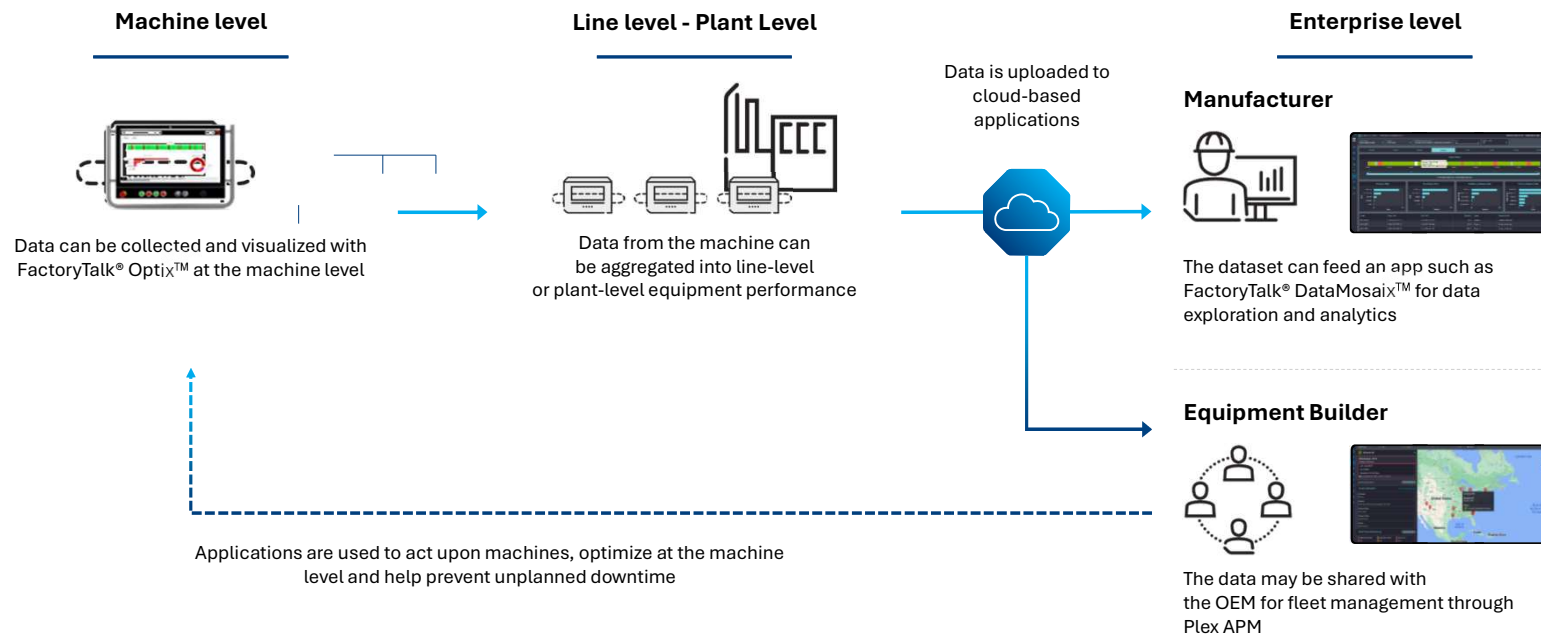
Leverage that information for analytics and insight at the machine

Organize that data and turn it into actionable information

Identify and/or create equipment-level data



STORE, CONTEXTUALIZE, VISUALIZE AND ANALYZE DATA



PLEX

fiix
BY KENNEDY & AUTOMATION

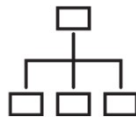
BYO

FACTORYTALK® OPTIX™ SUPPORTS VISUALIZATION AT THE MACHINE LEVEL, AND DATA EGRESS TO WHEREVER IT'S NEEDED



CONNECT

Integrate data from different sources, including seamless pairing with Smart Objects and Logix



CONTEXTUALIZE

Transform operational data with object-oriented modeling and contextualization, preparing data for analysis by other applications



VISUALIZE

Visualize and analyze data at the edge to empower real-time decision-making



COMMUNICATE

Share visualizations remotely and egress data to the cloud to feed other applications from both Rockwell Automation and third parties

Coming in 2025!

DATAREADY™ LIBRARY FOR SMART MACHINES

INFORMATION-ENABLED MACHINES TO ENHANCE CONNECTIVITY

ASSET OVERVIEW

Machine and Vendor metadata

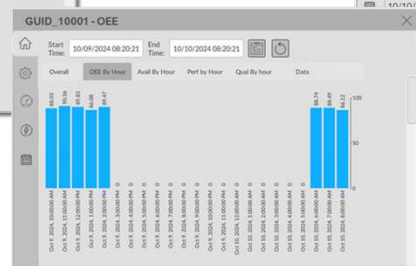
Link to related DataReady™ Models



OEE

Overall Equipment Effectiveness

OEE = Availability x Performance x Quality



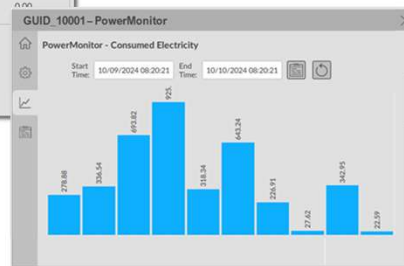
MAINTENANCE EVENTS

Monitor equipment status to trigger maintenance events including Work Orders

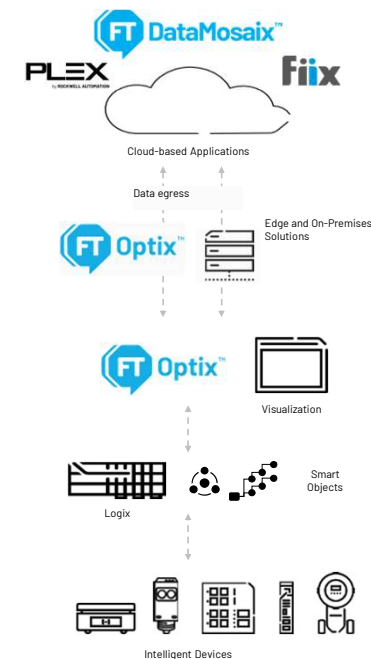


WAGES

Water / Air / Gas / Electricity / Steam consumption monitoring



INTEGRATED ARCHITECTURE®

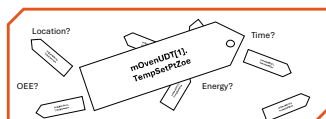


SMART OBJECTS STREAMLINE AND STANDARDIZE DATA PREPARATION

ORGANIZE DATA INTO INFORMATION MODELS AT THE SOURCE AND REDUCE TIME-CONSUMING EFFORT AT THE INFORMATION LAYER

Data output from Classic workflow

An expert spends hours organizing data to make it usable



Unstructured

Data points are not named intuitively, and relationships are not mapped

Unsynchronized

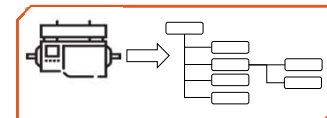
Inconsistent or disparate time stamps across different parts of the manufacturing process

Lacks OT context

Tagging and attributes must be assigned manually

Data output from Smart Objects

Data is organized automatically at the source



Structured

Data points are organized into an information model with relationships mapped

Synchronized

Time stamps on data from different sources are precise and consistent

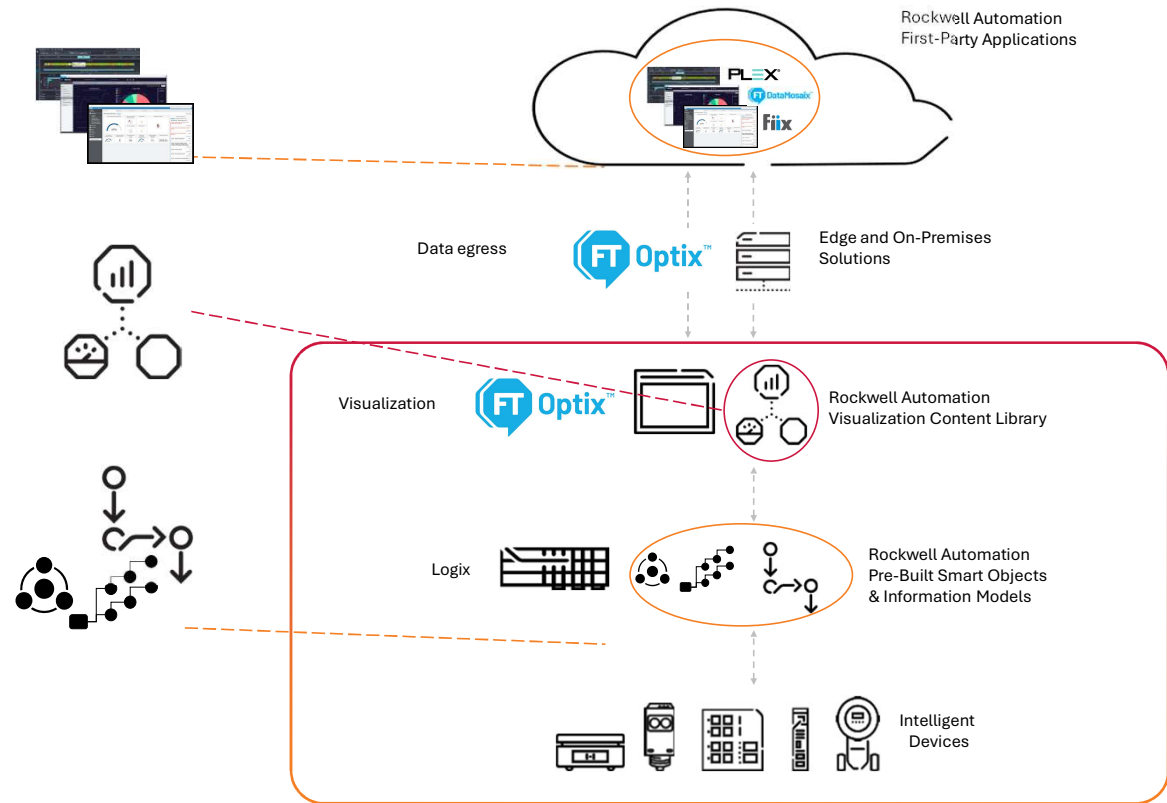
Contextualized

Data has attributes such as location, energy consumption and OEE information



ACHIEVE POWERFUL SYNERGIES WITH PREMIER INTEGRATION

- Simplify system integration by pairing **Rockwell Automation first-party applications** with first-party hardware
- Take advantage of the **Rockwell Automation visualization content library** with pre-built, reusable assets
- Use revision-managed, lifecycle-managed **Rockwell Automation information models** and simplify machine and equipment configuration with pre-built Smart Objects

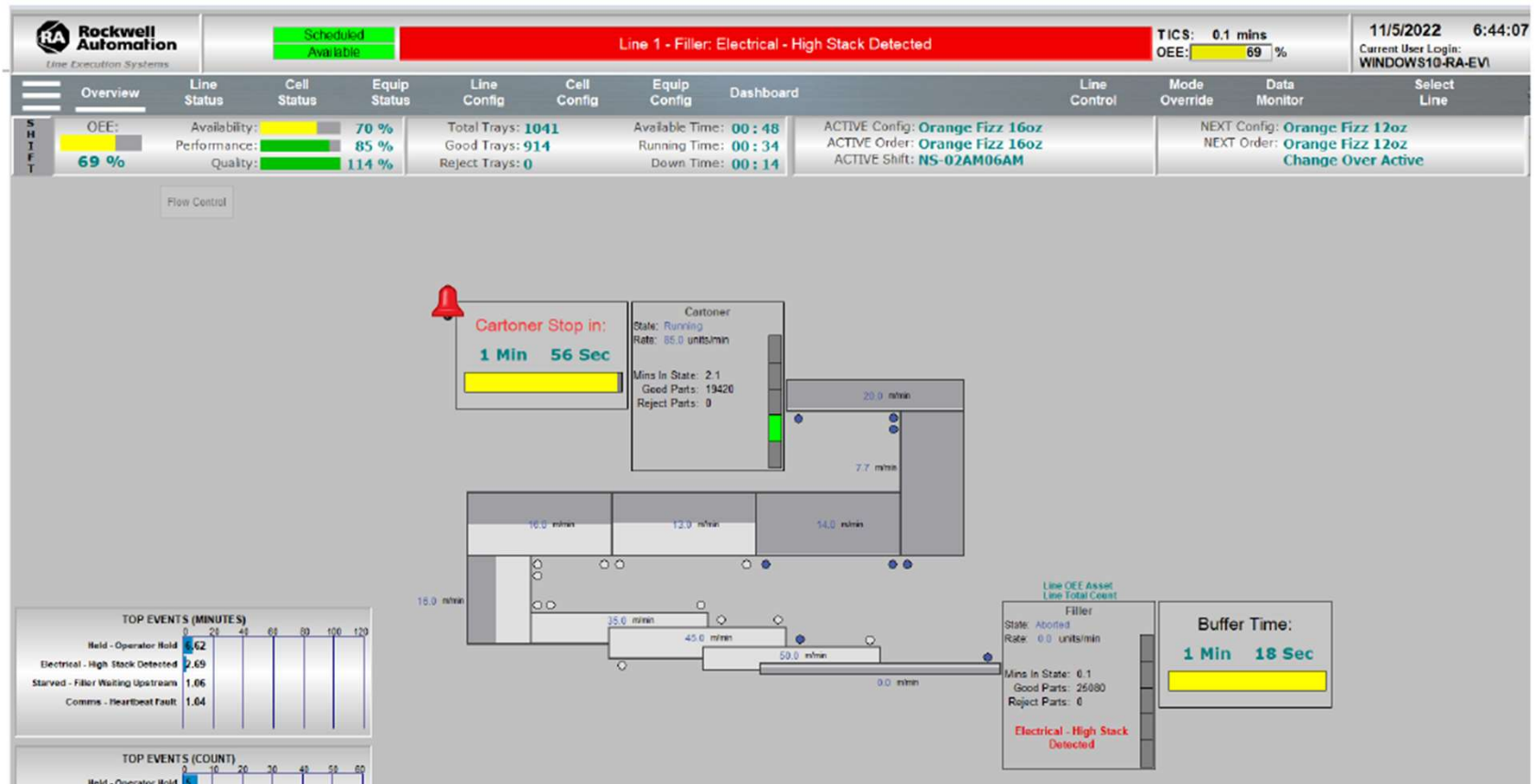




USE CASES LEVERAGING SMART OBJECT

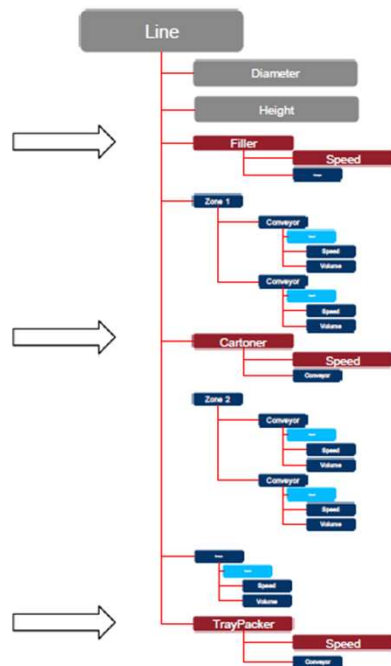
DYNAMIC LINE BALANCING

LINE BALANCING SYSTEM



LINE BALANCING SYSTEM

- Data Visualization – speeds and utilization by MACHINE
- By component utilization for a machine – automated dashboard generation



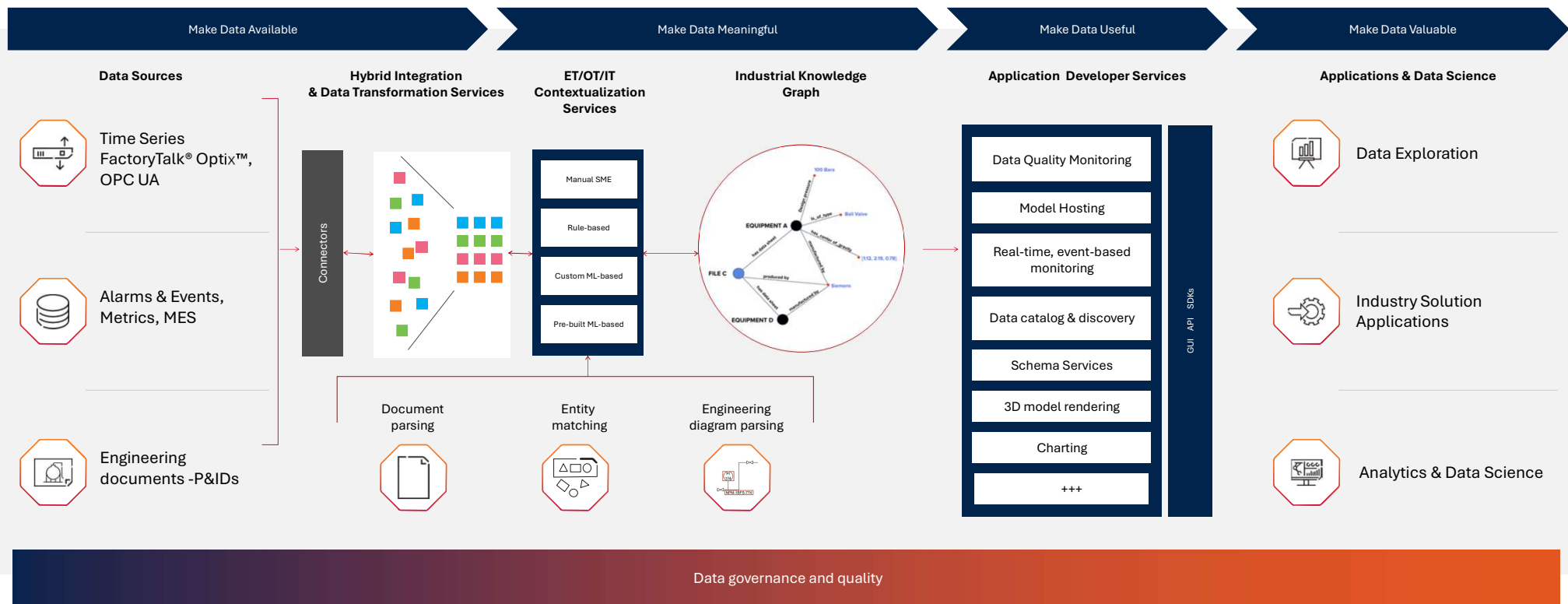


USE CASES LEVERAGING SMART OBJECT

ENTERPRISE DATA OPERATIONS

FACTORYTALK® DATAMOSAIX™ OVERVIEW

EXPOSE INDUSTRIAL DATA IN AN INDUSTRIAL KNOWLEDGE GRAPH TO REALIZE VALUE THROUGH APPS AND ANALYTICS



MAKE DATA AVAILABLE

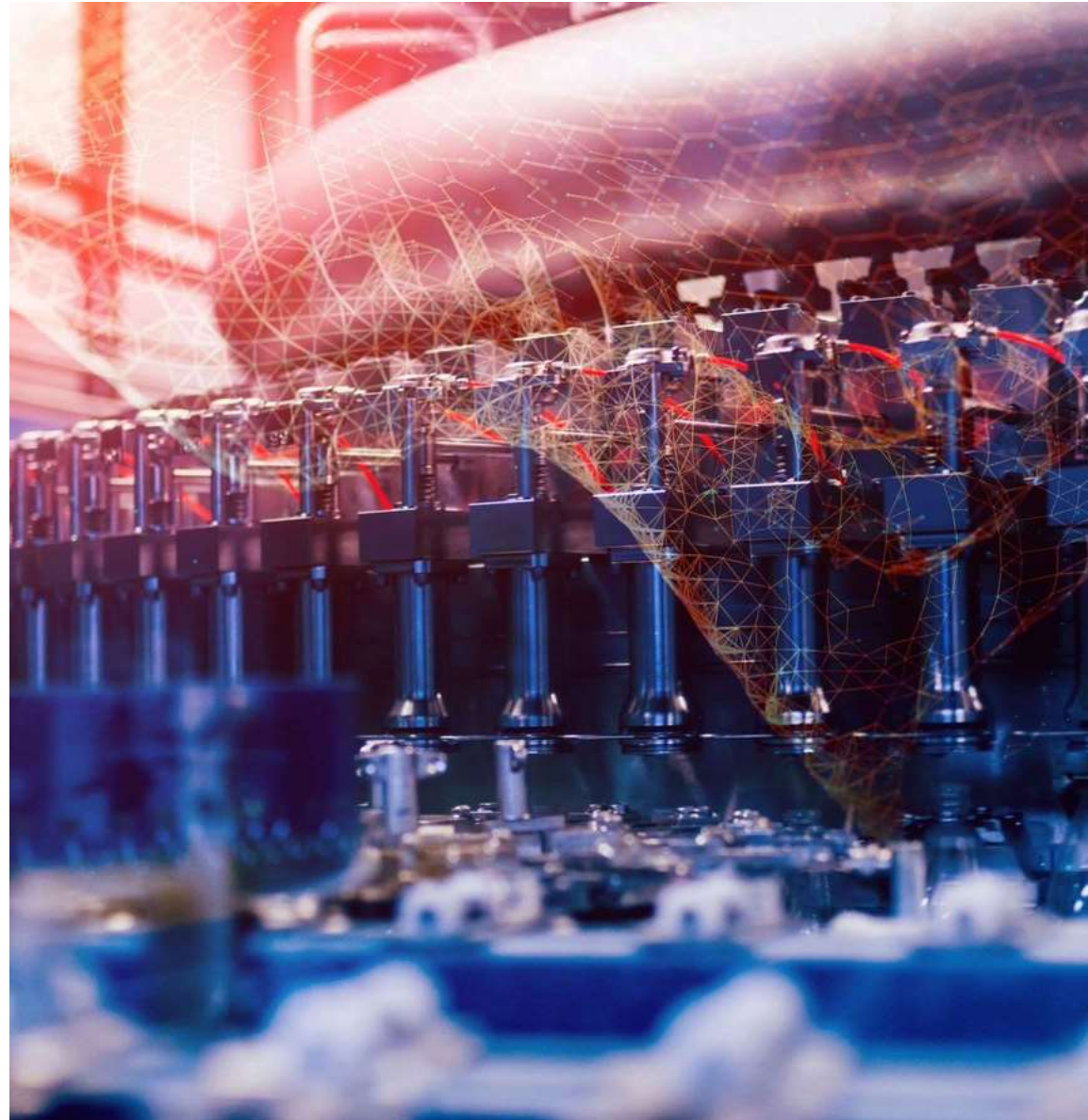
FREE YOUR DATA TRAPPED IN SILOS

Simplify data connectivity

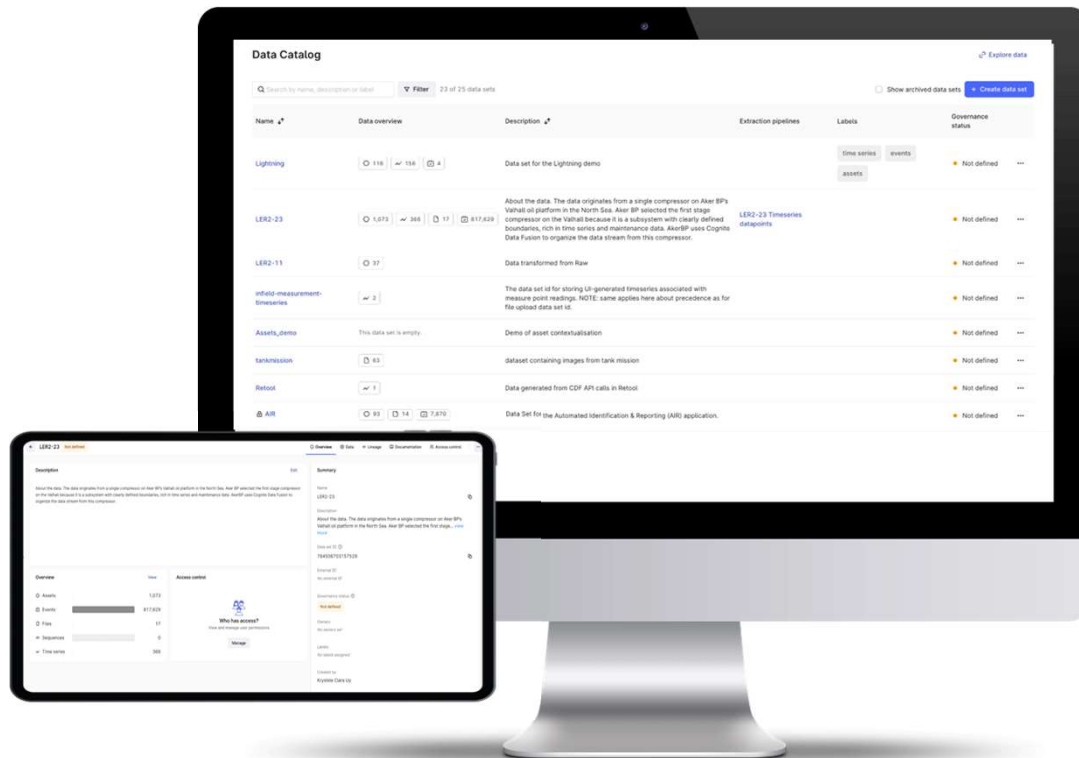
- Reduced manual effort to **collect data across many sources**
- Pre-built OT and IT data extractors for common industrial data sources
- Standard **integration with FactoryTalk® Optix™ for real-time data**
- Well-documented APIs and SDKs for custom extraction
- Standard import of engineering data

Capture data at scale

- **Rapidly scale** across machines, lines and facilities **with re-usable data pipelines**
- **Real-time monitoring and lifecycle management of data pipelines**
- **Full traceability** of data ingestion and transformation
- Configure and manage users and role-based access to data



DATA CATALOG AND USER MANAGEMENT



RIGHT INFORMATION TO THE RIGHT PERSON

- Govern data sets, set access controls and create streamlined view for all roles
- Enable scale by limiting sites to only see data set relevant to them
- Access data lineage, documentation and access control from a single location



MANAGING USER ACCESS

- Create groups to give certain user access to the correct functionality and capabilities based on role
- Set access policies to control access to site specific data or to enable partners access to data specific to their area of concern

MAKE DATA MEANINGFUL

EASILY CONTEXTUALIZE COMPLEX DATA

Accelerate data contextualization

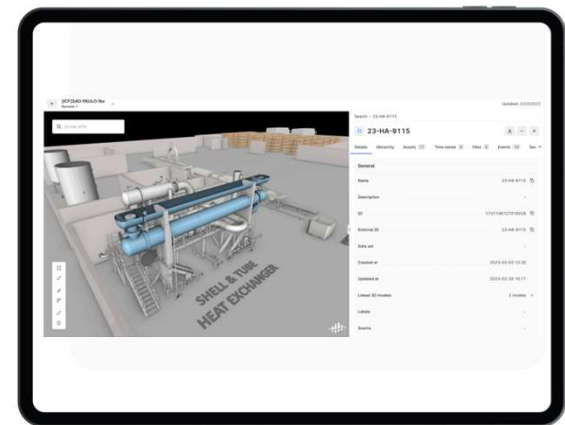
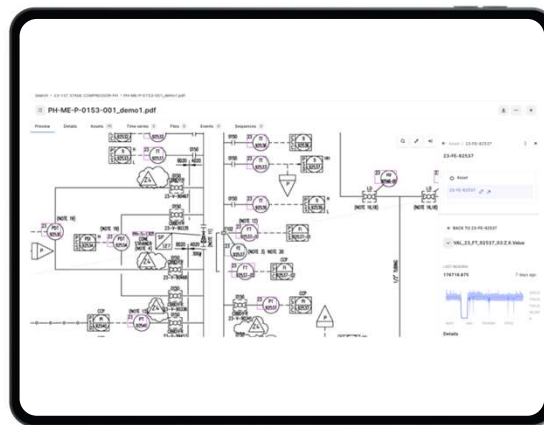
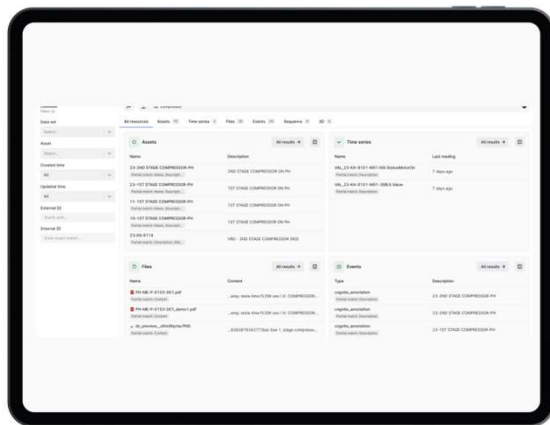
- **Give context** to time series, events, documents, images, 3D models and more
- **Create logical relationships** between all data types, even with different naming conventions
- **AI-enabled automated contextualization** services
- **Image and video contextualization** and management

Link digital to physical

- Bring static documents to life
- **Create interactive engineering diagrams** to easily understand the physical context of time series data, alarms, work orders and so on



DATA EXPLORATION



Find data in seconds,
not hours



Explore all data through a **traditional asset hierarchy** and **add additional search context** for enhanced filtering



Navigate process diagrams and other engineering drawings for a **process-oriented view**



Use **contextualized 3D models** to access time series, drawings, events, files and more through a unified UI

MAKE DATA VALUABLE

GENERATE THE INSIGHTS THAT DRIVE ACTION

Conduct ad-hoc domain expert analysis

- **No-code analysis** of time series and events data with an industrial data analytics library
- Domain experts can **share insights and collaborate**

Deploy scalable applications

- **Pre-built connectors** for industry standard visualization tools
- Open APIs and SDKs for application developers
- **Rockwell Automation** Industry Solutions

Develop advanced analytics

- **Standard connectivity** to leading data analytics and simulation tools for data scientists
- Develop, run and share code in **Jupyter notebooks**





USE CASES FT DATAMOSAIX

DATASCIENCE

FACTORYTALK® DATAMOSAIX™ WAS USED FOR STENCIL WEAR AND TEAR AT TWINSBURG

30-60 DAYS

**EARLY DETECTION
OF A WORN ITEM**

200%

**ROI ON DIRECT
LABOR COSTS**

\$9M

**INCREASED
REVENUE CAPACITY**

10+

**ADDITIONAL USE
CASES PLANNED**

WHAT WAS THE CHALLENGE?

Over **4000 unique SKUs** manufactured annually with significant inspection and rework

Complex process with interchangeable tools of **high variability** in durability

Data wrangling and cleansing challenges led to **delayed maintenance** recommendations

WHAT WERE THE KEYS TO SUCCESS?

Better data modeling to **contextualize data** for statistical analysis

Keeping the analysis fresh and trusted with **data pipelines** from source systems

Microsoft Teams integration to provide accurate **real-time alerts** to operators

Extensibility to the next use case

REVIEW OF USE CASE

PCBA SMT PROCESS AND DATA SOURCES

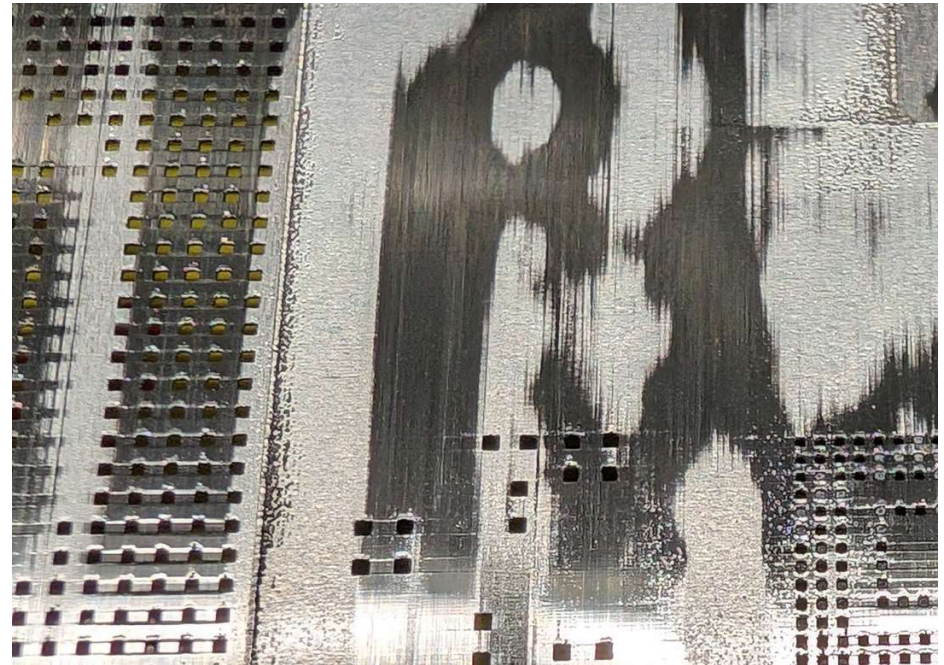


PRINTING WEAR ITEMS

SQUEEGEES



STENCIL (SHOWING WEAR AT ~10,200 PRINTS)



REVIEW OF USE CASE

PCBA ASSEMBLY ON SMT (SURFACE MOUNT TECHNOLOGY) LINES

NOISY PROCESS

Identify wear and tear in a noisy environment
(frequent setup, pause to print, etc)

Identify degrading performance before it has
significant effect on the process

ALGORITHMIC APPROACH

Ability to dampen startup/setup issues

Tunable sensitivity and thresholds

Autonomous notification of issues

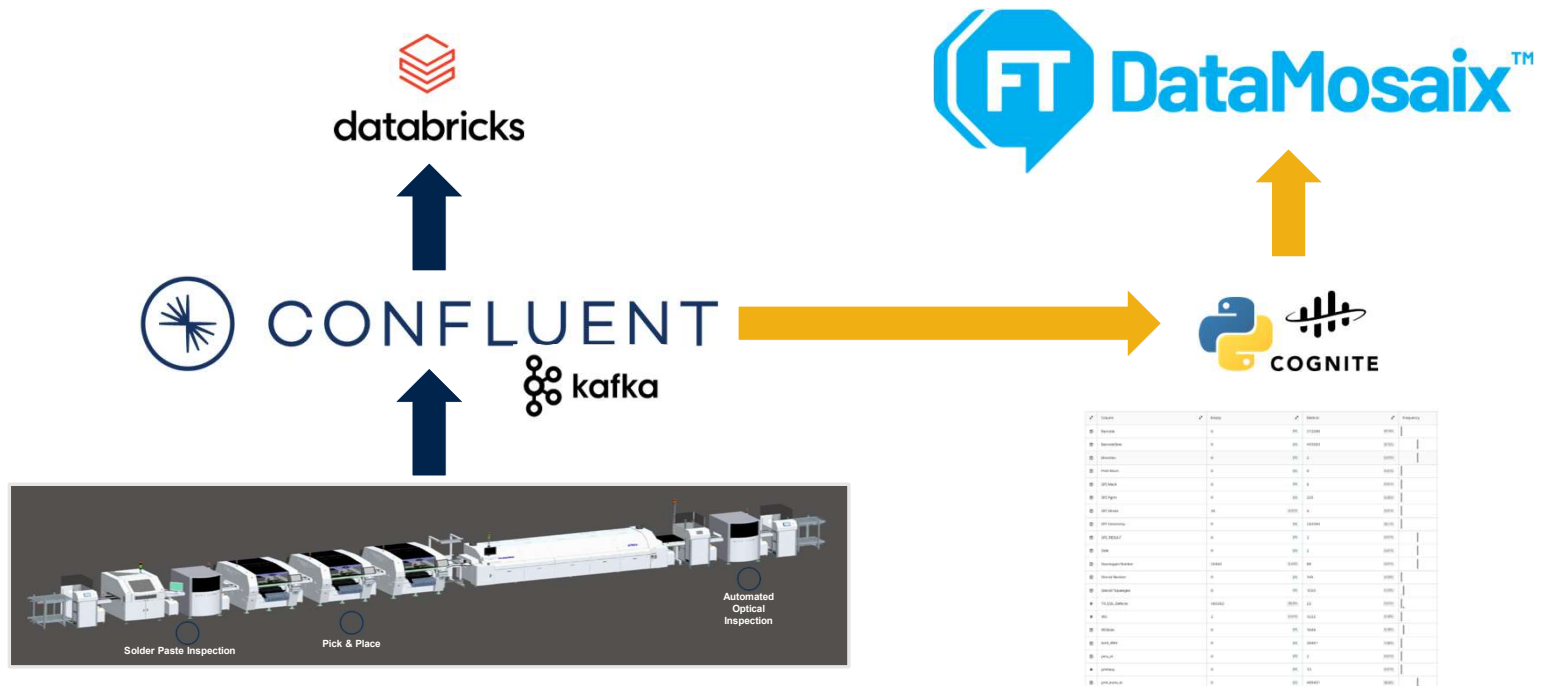
MINIMIZE EXPLORATION

No plant resources to dig through reports and
find opportunities

Be notified when/before performance starts to
go awry!

DATA FLOW OVERVIEW

EXISTING DATA STREAMS WERE LEVERAGED – MAKING THE PROJECT ESSENTIALLY ZERO IMPACT ON EXISTING INFRASTRUCTURE



TWINSBURG DISCRETE DATA MODEL CONCEPTS

Recipe	Assembly Number
Product	Barcode
Product Component	Barcode Side

PRODUCT

Batch	Workorder
Unit Procedure	Workorder Side
Operation	N/A
Task	Stencil, Squeegee, SPI Program
Task KPI	KPI data for each task, like per stencil reject rate
Time Series	Time series data for KPIs

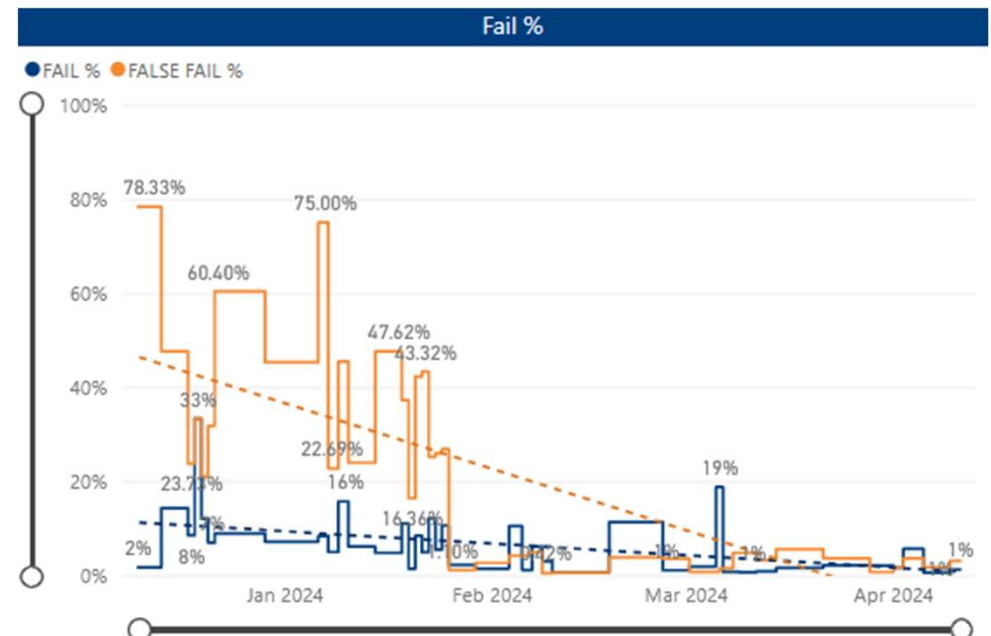
PROCESS

Enterprise	Rockwell
Site	Twinsburg
Area	Assembly line
Production Line	SM1, SM2, SM3, SM4, SM++
Work Cell	Printers, SPI Machines ++
Equipment Module	Per work cell module for per item data for stencil, squeegee +++
Time Series	Time series data for modules

EQUIPMENT

ACTUAL RESULTS

- Stencil STB0000527, January 23, 2024
- System detected wear on this stencil
- Stencil Tag is miss-labeled
- Stencil Replaced Jan 26th
- Fail% improved from 9% -> 2%
- False Fail% improved from 29% -> 2%



BEFORE:

Program Name	Prints	GOOD Prints	FAIL Prints	Operator PASS Prints	FAIL %	SPI X1 (Fail% * Fails)	FALSE FAIL %
	7347	4,553	661	2,133	9%	59.5	29.03%

AFTER:

Program Name	Prints	GOOD Prints	FAIL Prints	Operator PASS Prints	FAIL %	SPI X1 (Fail% * Fails)	FALSE FAIL %
	5009	4,818	91	100	2%	1.7	2.00%

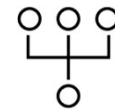


**A CLEAR DATA STRATEGY ISN'T JUST
AN ADD ON, IT'S A MUST FOR
REDUCING COSTS, MAXIMIZING
OUTPUT, AND MINIMIZING RISK.**

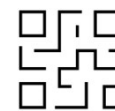
MAKE DATA WORKING CAPITAL



Actionable insight to your stakeholders.



Autonomous orchestration of your processes.



Enabling optimization and innovation.



QUESTIONS?
THANK YOU!