nexbe+

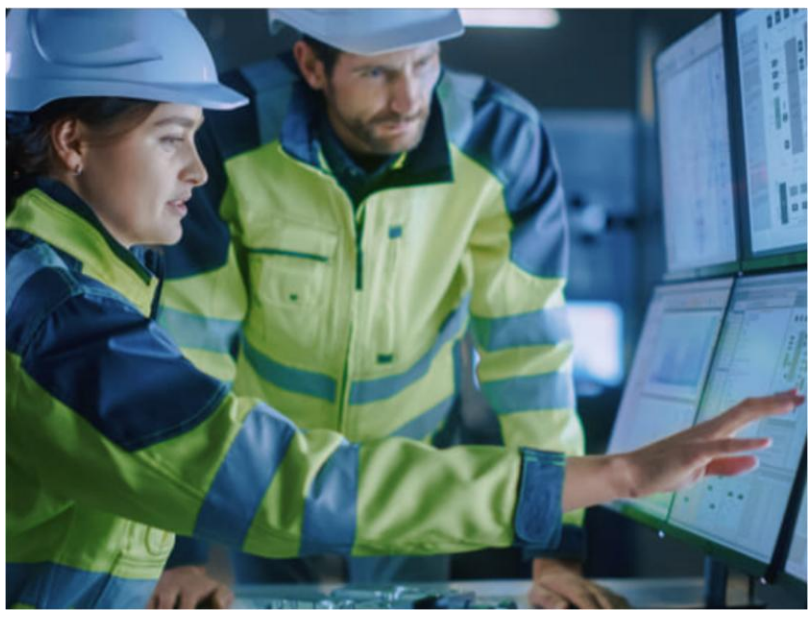
Integrated Automation and Control Solution

Our smart factory platform offers a range of packaged solutions for optimized factory automation, ensuring a smooth and reliable experience from installation to operation.
By harnessing data from individual equipment and inter-equipment processes, our integrated solution streamlines production management, equipment maintenance, and real-time monitoring. With instant processing capabilities, it helps customers make better use of their resources and achieve maximum operational efficiency.

MES

Manufacturing Execution System

Field-oriented Optimized service



What does it do?

nexbe+ MES (Manufacturing Execution System) is a real-time manufacturing management and monitoring system designed to automate and optimize various production activities on the shop floor.

Its key features include the following:

1. **Production plan execution:** It executes and manages production plans received from higher-level systems (e.g., ERP) on the factory floor.
2. **Real-time monitoring:** It collects real-time data from the manufacturing process to monitor equipment operation status, production volume, and quality.
3. **Quality control:** It collects and analyzes quality data throughout the manufacturing process for early detection and proactive resolution of quality issues.
4. **Inventory management:** It monitors raw materials, work-in-progress, and finished goods in real time to prevent shortages and excess stock.

Data visualization ‘strategy' not 'tool'

Our enhanced MES, built on extensive experience in the semiconductor and LCD high-tech industries, is designed to efficiently manage production resources in all automation sectors.

Industry Standards

- Compliant with SEMI Standard CIM Framework and eziLib-based system
- Optimized for the semiconductor, LCD, and assembly industries
- Supports various operating systems (e.g., Solaris, Linux, and more)
- Provides a separate module for mobile-accessible content

Maximized Efficiency

- Tracks work-in-progress (WIP) in real time, ensuring improved efficiency, accuracy, and traceability

Proven Reliability

- Extensively tested and validated in the semiconductor, LCD, and general manufacturing industries

Enjoy!

Good UX Validation History
Management Spec Management

01

User-centric MES features

Factory Modeling

- Defines factory roles, functions, and scope
- Defines Factory, Area, Equipment, Modules, Equipment Status, and Recipes
- Defines production products, raw materials, and consumables
- Defines products, durables, consumables, and their relationships

Process Modeling

- Defines unit processes, process flows, and relevant reference data
- Process, Process flow, Process Policy

RunTime Management

- Manages the status and history of materials and products
- Manages results history, including measurement and equipment process status
- Provides automated data analysis for measured results, including average, standard deviation, and other key metrics
- Maintains a detailed record of equipment, dependent equipment, and port operations
- Monitors operational status and automation-related conditions for equipment and dependent equipment

Alarm Tracking

- Logs alarm occurrences and troubleshooting
- Issue, Acknowledge, Clear, Actions

02 Data-driven Quality Control

Quality control

- OCAP (Out of Control Action Plan based on SPC and DCOL)
- Sampling rules (measurement process)
- Run cards (establishing process flows for various tests)
- Seasons (minimizing idle time for continuous equipment operation, particularly in CMP processes)
- NPW (process and equipment quality control, particle monitoring)
- Inhibit function (equipment constraint control)
- PWQ (Process Window Qualification), EDL (Early Detection Lot), EIN, ECN
- SBL (Statistical Bin Limit)
- Q-Grade (Classification of wafers based on yield grade)

Configuration Management and Deployment

- Supports version changes by reviewing and confirming changes to source files, documents, and components with fundamental principles, strategies, and technologies used to ensure convenient development and maintain the environment

Product Configuration

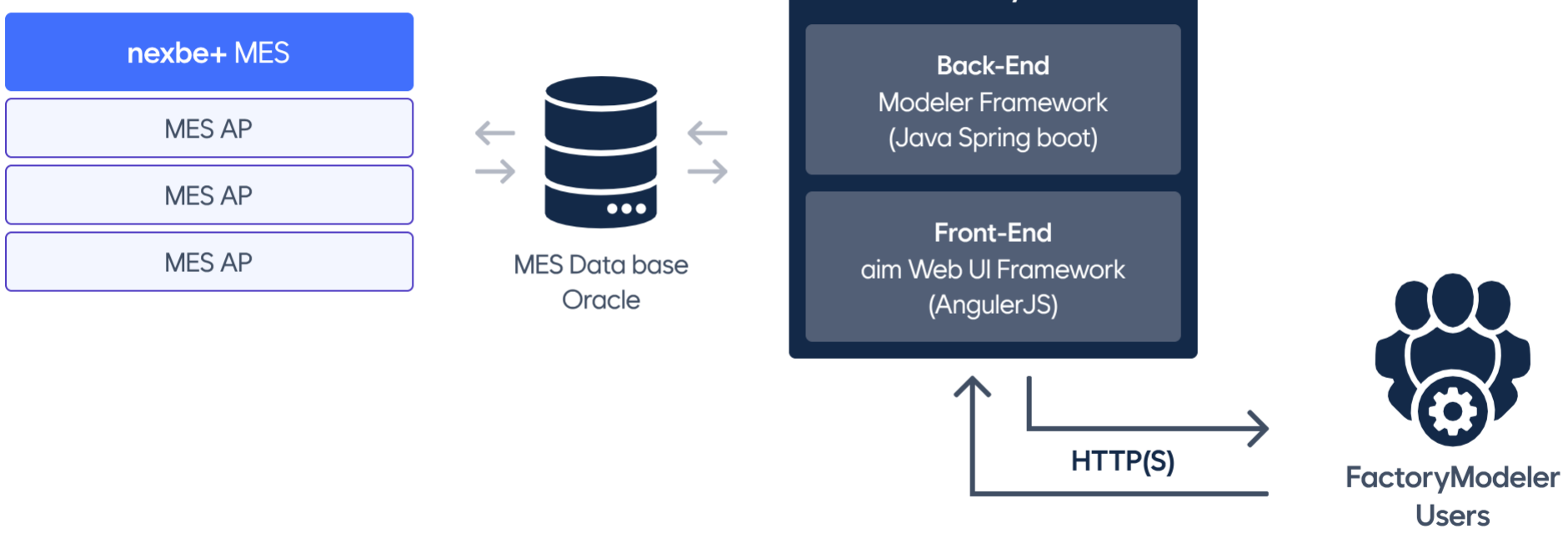
Development Environment

- **aim Web UI Framework**

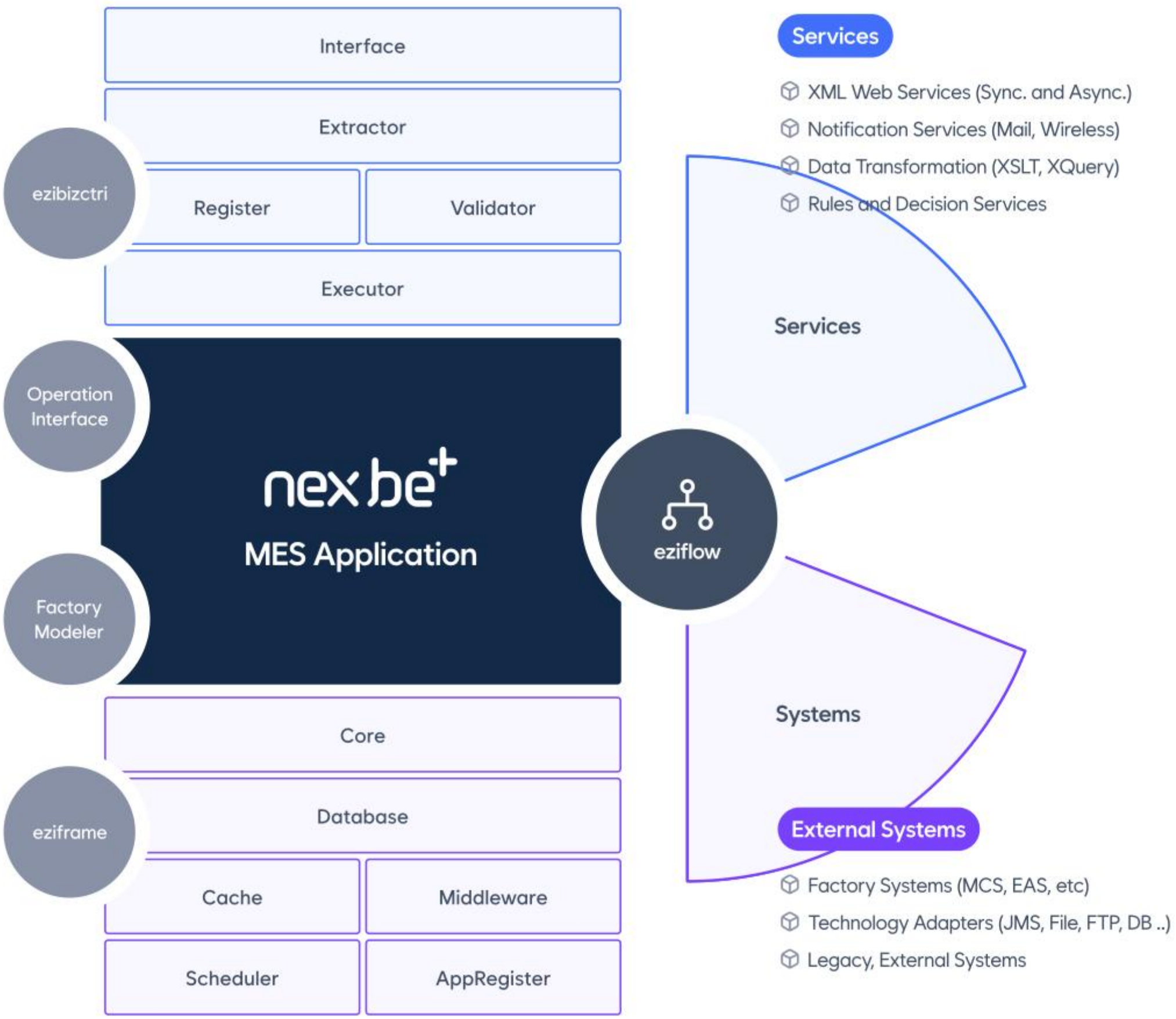
Back-end Spring Boot Framework	**Front-end** Vue JS (JavaScript UI Framework)
IDE Env. Spring Tool Suite, Maven	Comply with Html 5 standard + CSS3

- **Application Framework**

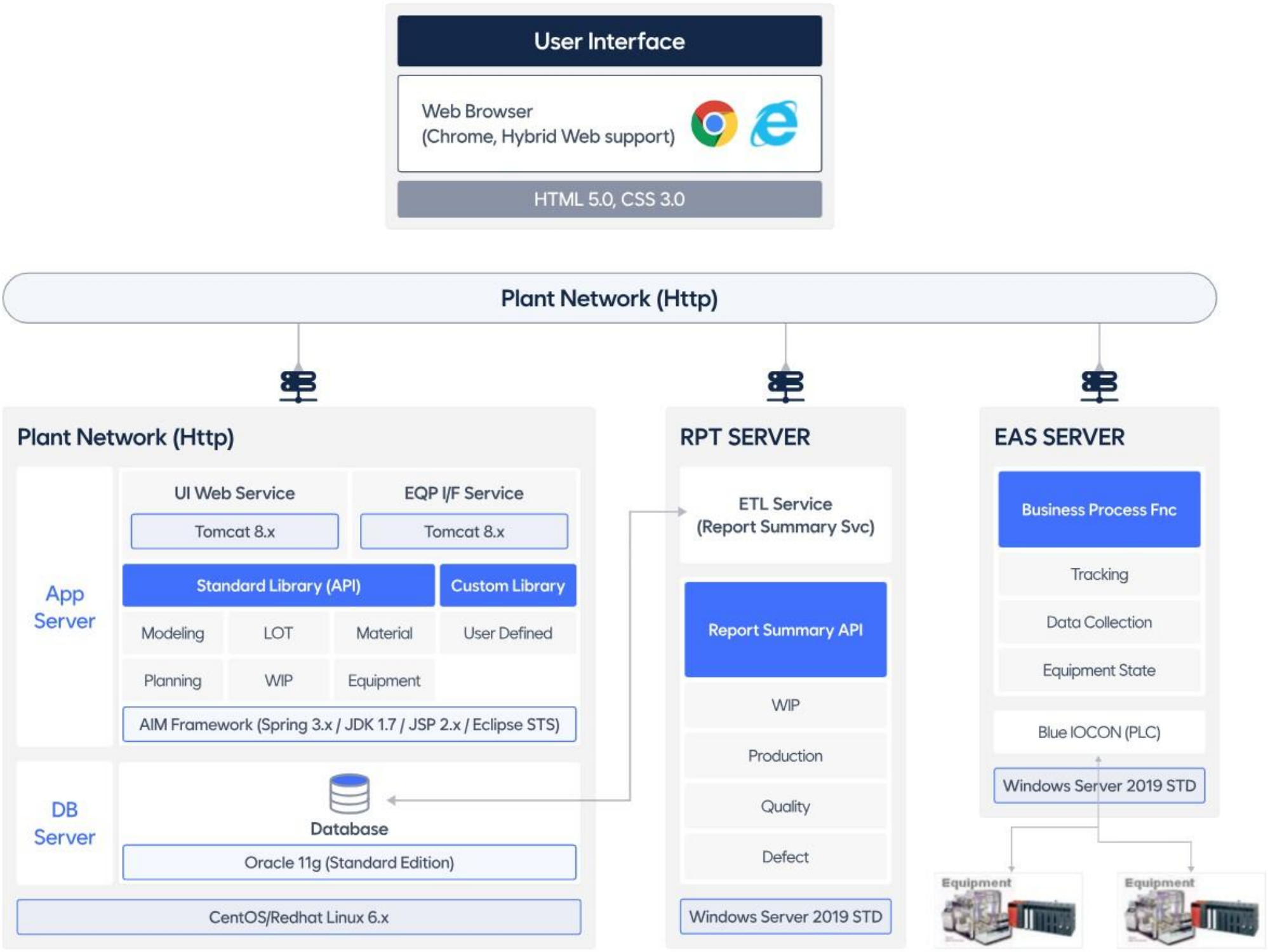
Three-tier architecture featuring a front-end, back-end, and DB server	Uses HTTP(S) and JSON (JavaScript Object Notation) to communicate with the front-end	Transactions and Execute Queries managed by JDBC



Configuration Diagram



Hardware Architecture

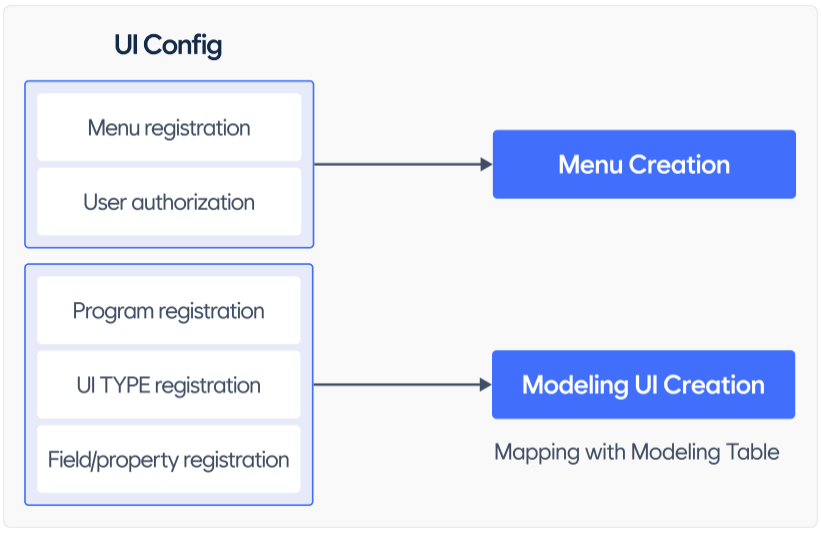


Field-oriented Optimized service

01 **Enhances development efficiency by integrating the strengths of multiple solutions**

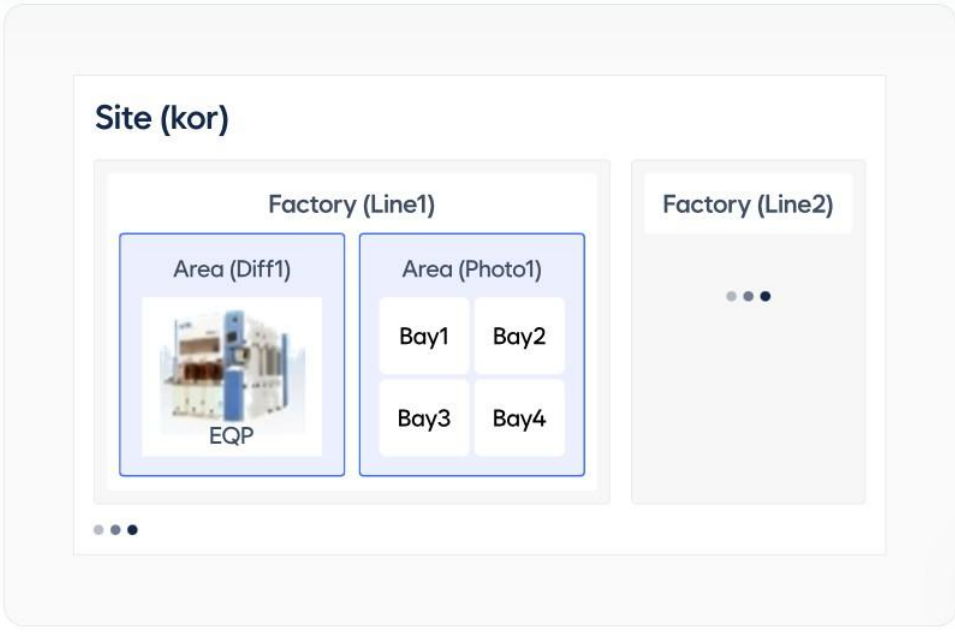
1. Common Functionality

- Enables the development of modeling UI without source code using UI composition features
- Supports individual checkout functionality for controlled editing
- Enables flexible access control, such as integrated login, with OI and one-source development
- Ensures full version control of all data

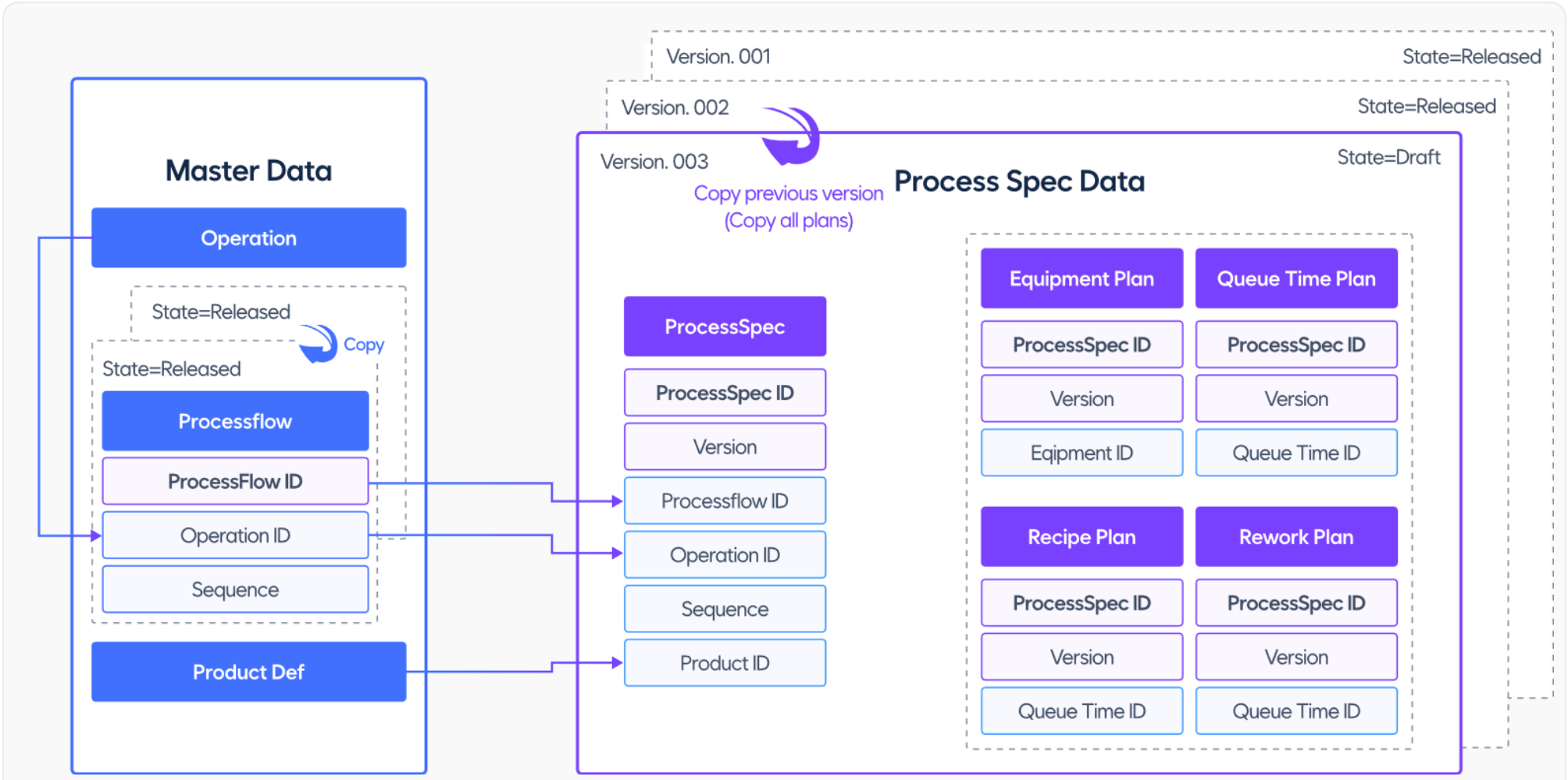


2. Factory Modeling

- Provides factory modeling optimized for semiconductor and display FABs
- Implements modeling features for equipment type-specific control, such as batch rules

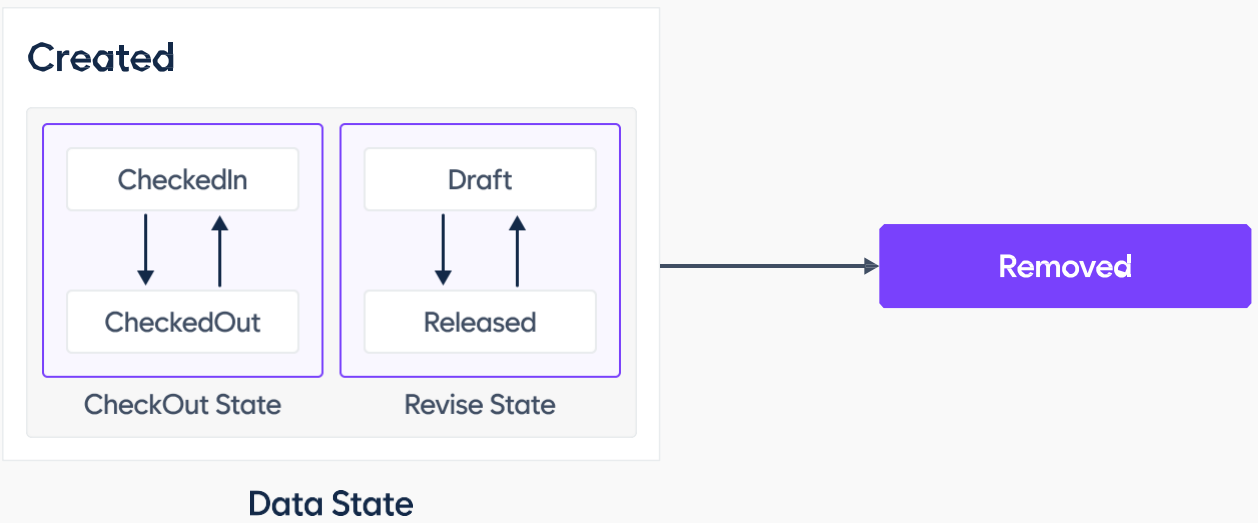


02 Flexible and Scalable Process Version Control



1. Process Modeling

- Implements process modeling optimized for semiconductor and display FABs
- Supports consistent version control for streamlined change management (Draft <-> Released)
- Enables scalable policy modeling for various process requirements



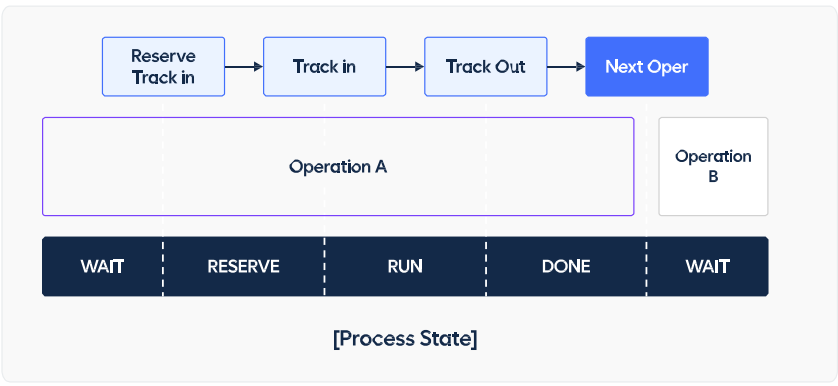
2. Material Modeling

- Product specification modeling
- Reticle Master modeling
- Carrier Master modeling (FOUP, POD)
- Reference data modeling for various material types

03 Lot Tracking with Equipment-specific Characteristics

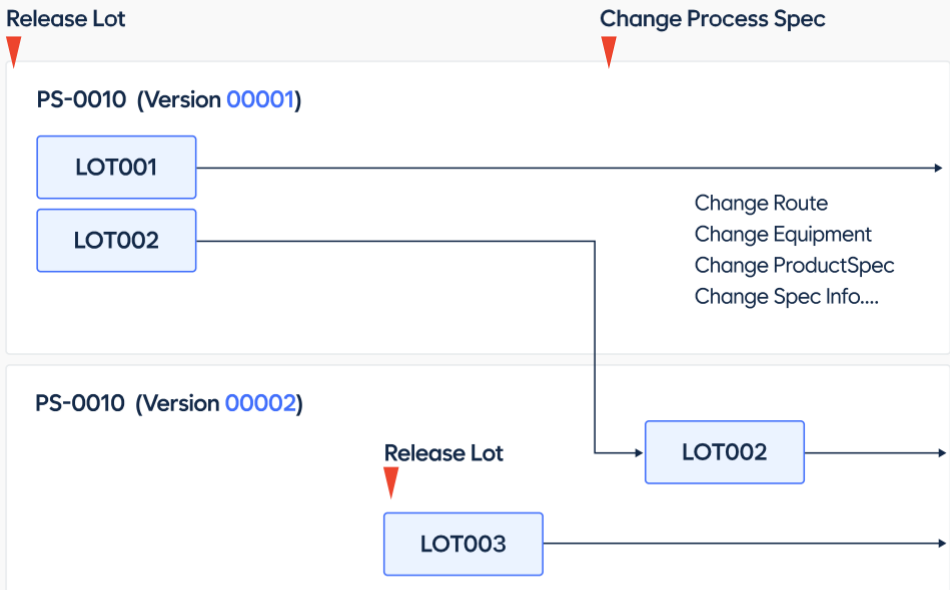
1. Lot State & Process State

- Manages process states based on production conditions
- Implements tracking features tailored to different equipment types
- Provides a work-in-progress (WIP) list optimized for operator workflows



2. Lot Control

- Handles abnormal case scenarios
- Supports process specification changes for ongoing lots with version control
- Multi Hold / Release
- Wafer Scrap / Cancel Scrap
- Rework / Cancel Rework
- Change Spec / Priority
- Split / Merge
- Future Action

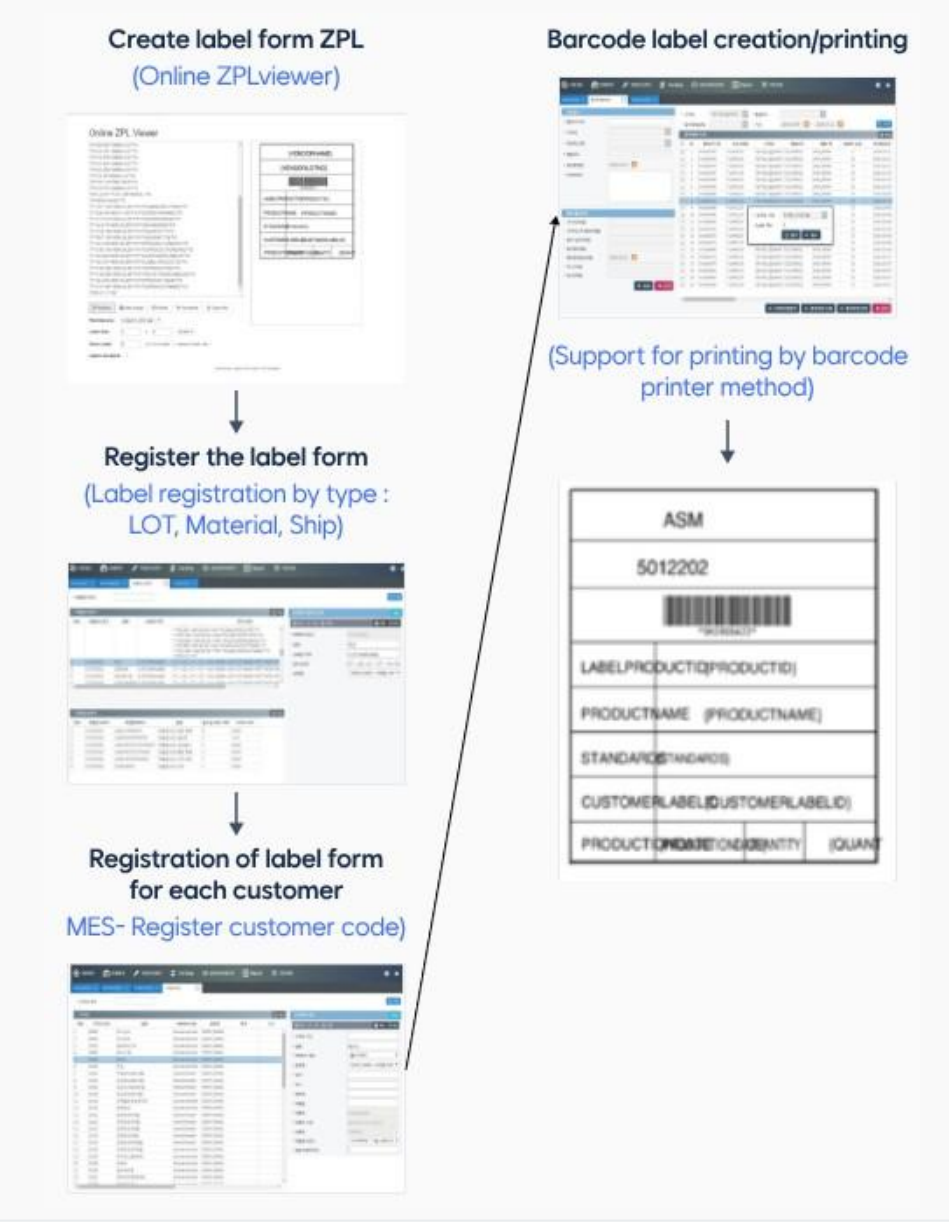


[Change Spec Example]

04 Label Management

Key Features

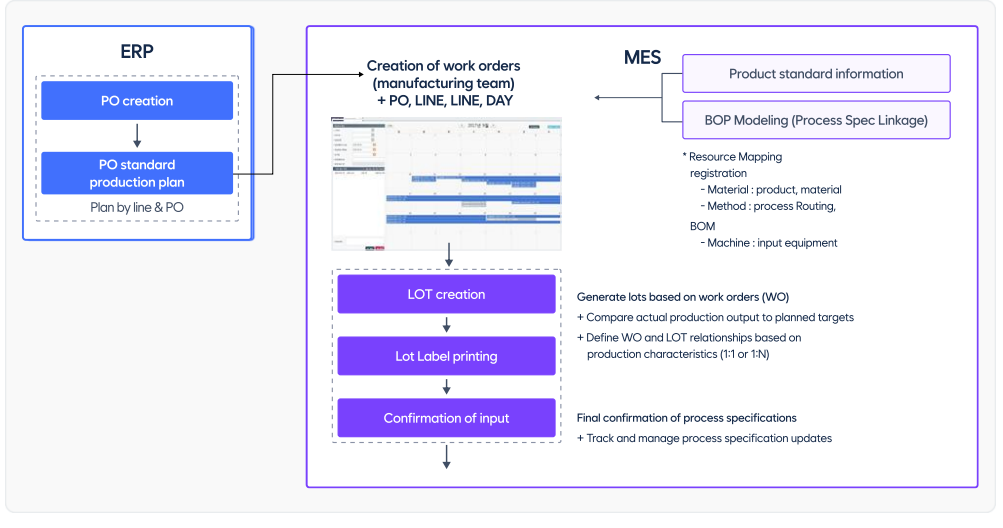
- **Web preview**
  - View and edit ZPL labels directly from the web UI
  - General users can easily edit labels
- **Unique label IDs for different label types**
  - Manage various label templates
  - Easily add and modify different labels
- **Label types mapped based on customer ID**
  - Manage shipping labels separately for each customer
- **Label barcode printingLabel types mapped based on customer ID**
  - Supports various label printing methods
  - Supports network printer configuration for multiple printers



05 Work Order

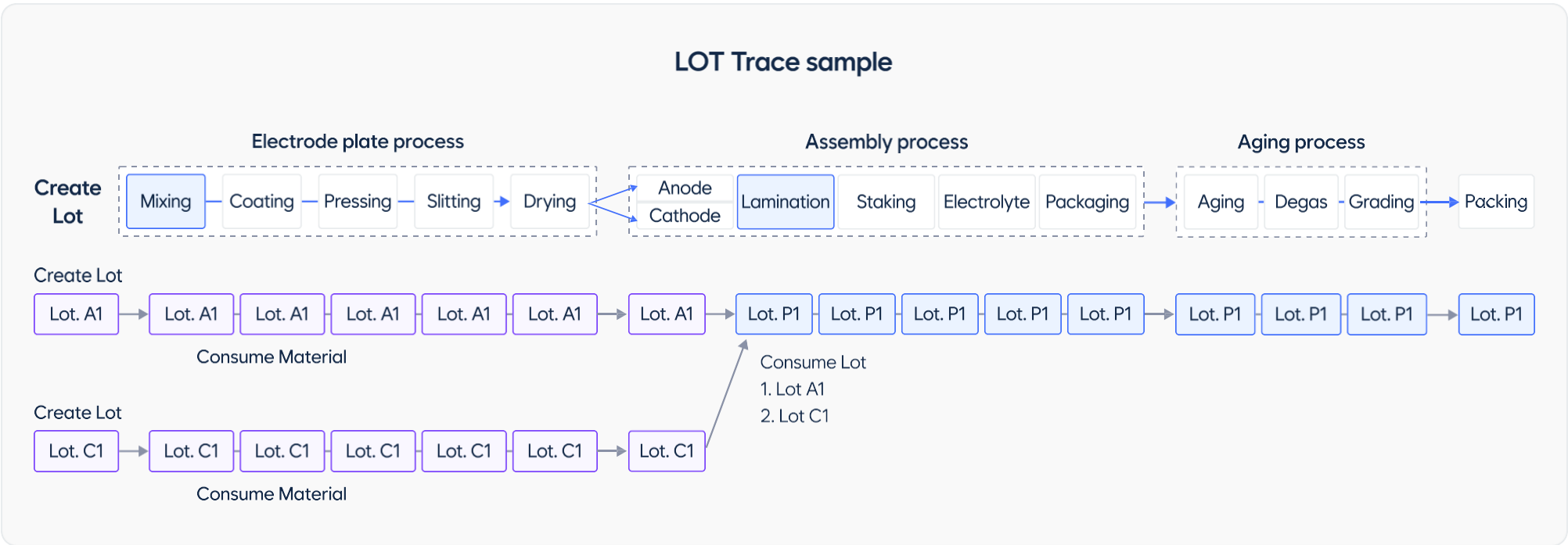
Key Features

- Create work orders using a calendar viewer for input planning
- Upload work order planning data as a file
- Define WO and LOT relationships based on production characteristics (1:1 or 1:N)



06 Lot Tracking

- Design lot traceability models tailored to production site characteristics and track the full history of all lot events



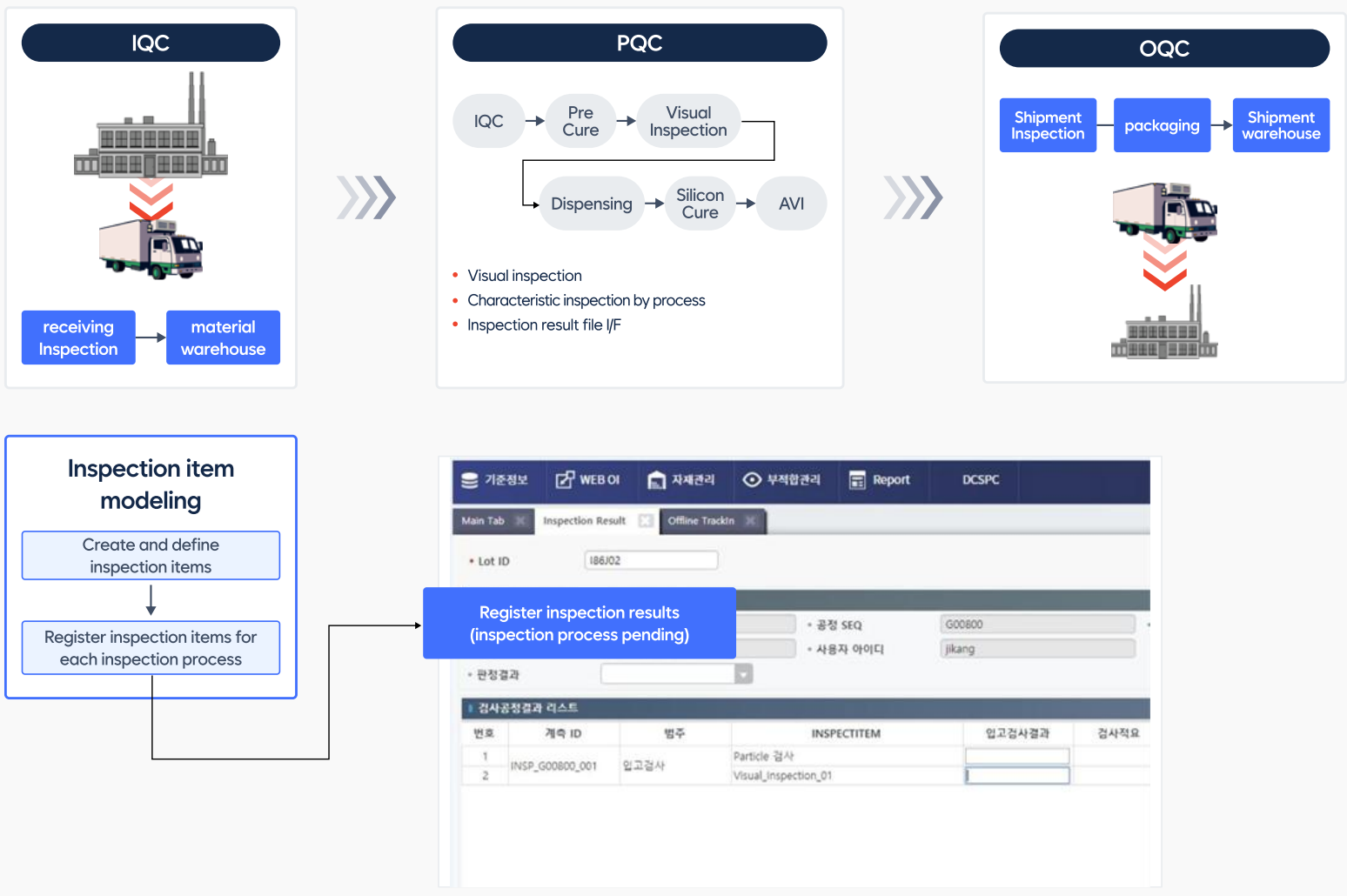
Ensuring lot traceability

- Apply online tracking at key facilities to automatically collect product/material data
- For equipment not integrated online, operators can manually input data through MES or BCR to track equipment, products, and materials

Benefits

- Real-time data collection with automation/MES for improved lot tracking
- Monitor incoming inspections, process progress, material usage, and lot changes
- Three-stage lot ID management (Consumable Lot, Assembly Lot, Shipment Lot)

07 Quality Control



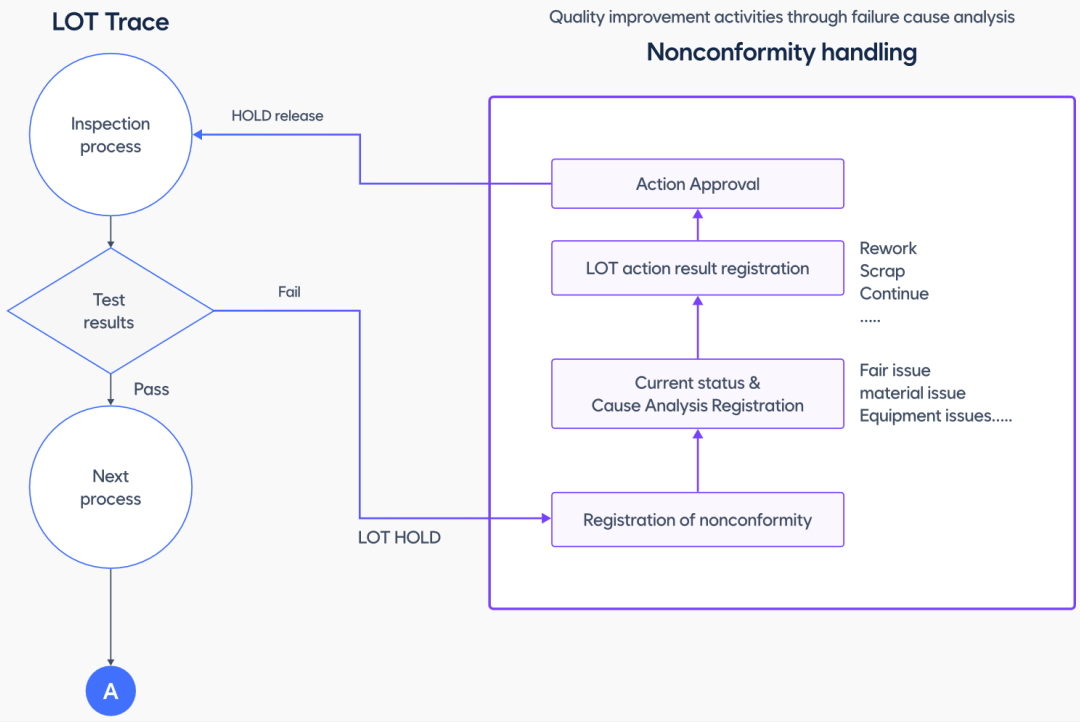
Key Features

- **Inspection item modeling**
  - Register inspections
  - Register items for each inspection process
  - Seamless management with modeling
- **Register inspection results**
  - Log inspection results for IQC, PQC, and OQC
  - Collect results via file I/F
- **Nonconformance handling and integration**
  - Hold lots when defects are found and integrate them into nonconformance workflows

08 Defect Management

- When defects or nonconformances occur in the inspection or measurement process, the system provides failure cause analysis to support quality improvements and offers historical data for future quality analysis.

Nonconformance handling

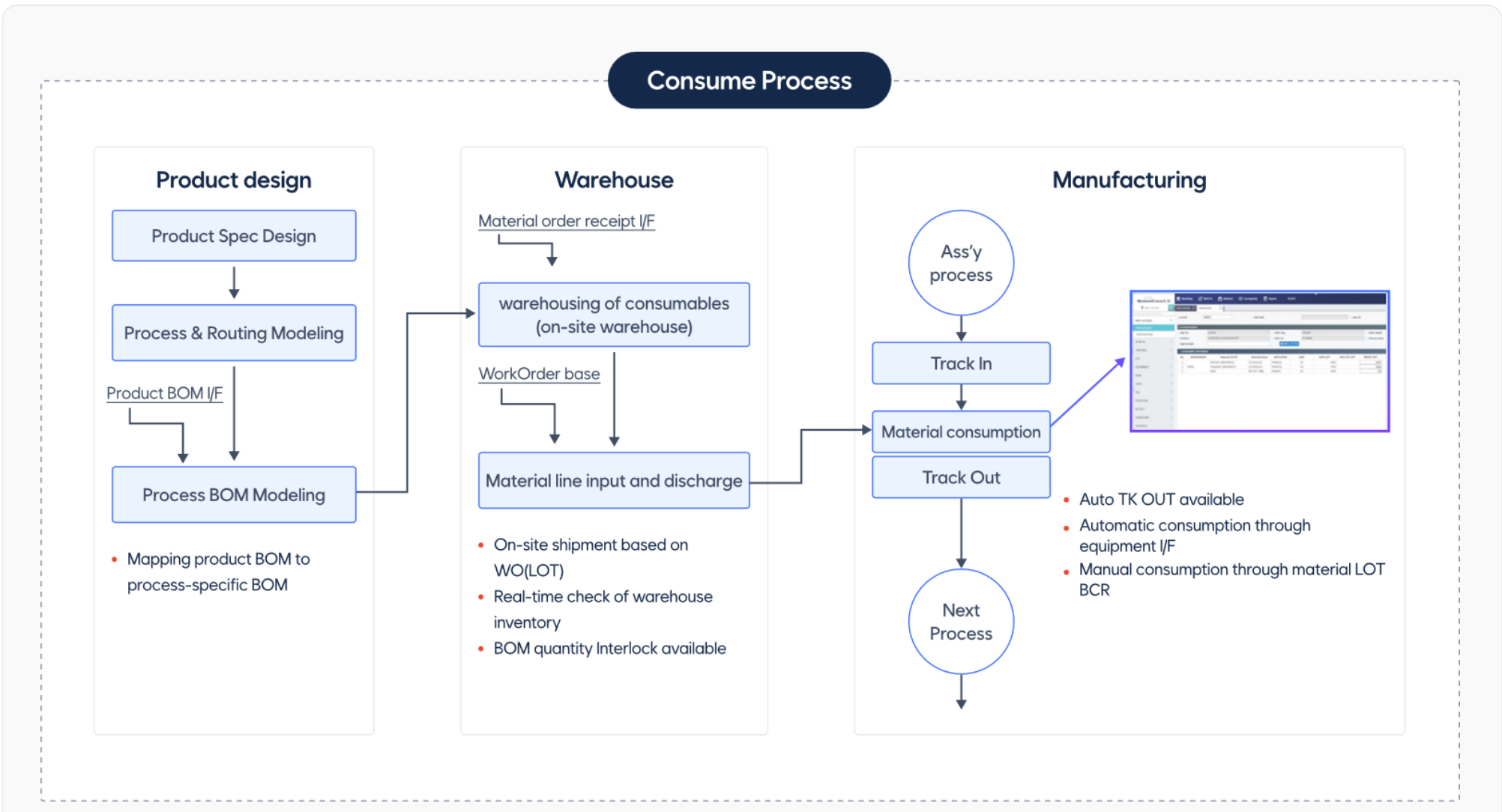


Key Features

- **Application of various nonconformance scenarios**
  - Fail by Inspection Result
  - When Measure Data Spec Out occurs
- **Nonconformance process management**
  - Registration of nonconformity
  - Current status & Cause Analysis Registration
  - LOT action result registration
  - Establishment of measures to prevent recurrence(Option)
  - Action Approval

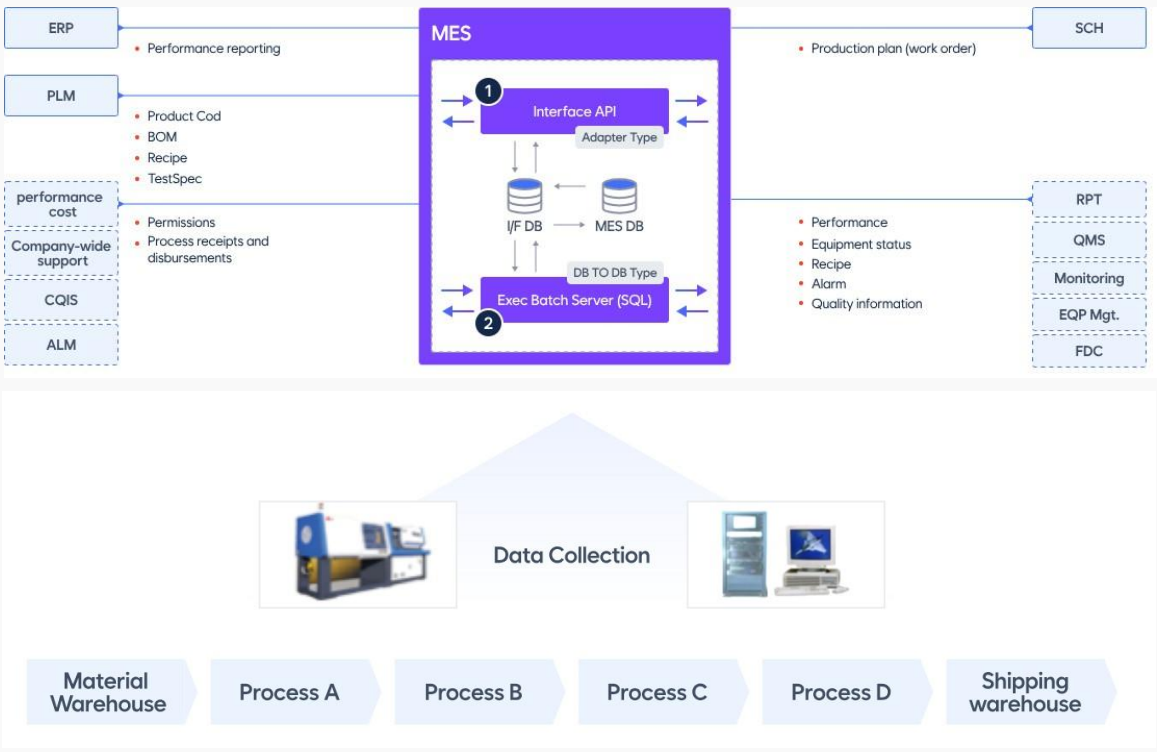
09 Material Consumption

- BOM modeling and management using a product BOM I/F
- Consumable tracking based on WO
- Supports direct material consumption in manufacturing processes, such as assembly lines, with on-site warehouse routing (allows both online and manual equipment tracking)



10 Legacy System Interface

- The legacy system interface can be implemented in various ways, including DB-to-DB integration and custom adapters.
- Interfaces standard data and executes production based on work instructions in the scheduler while interfacing various data generated during operations with the necessary systems

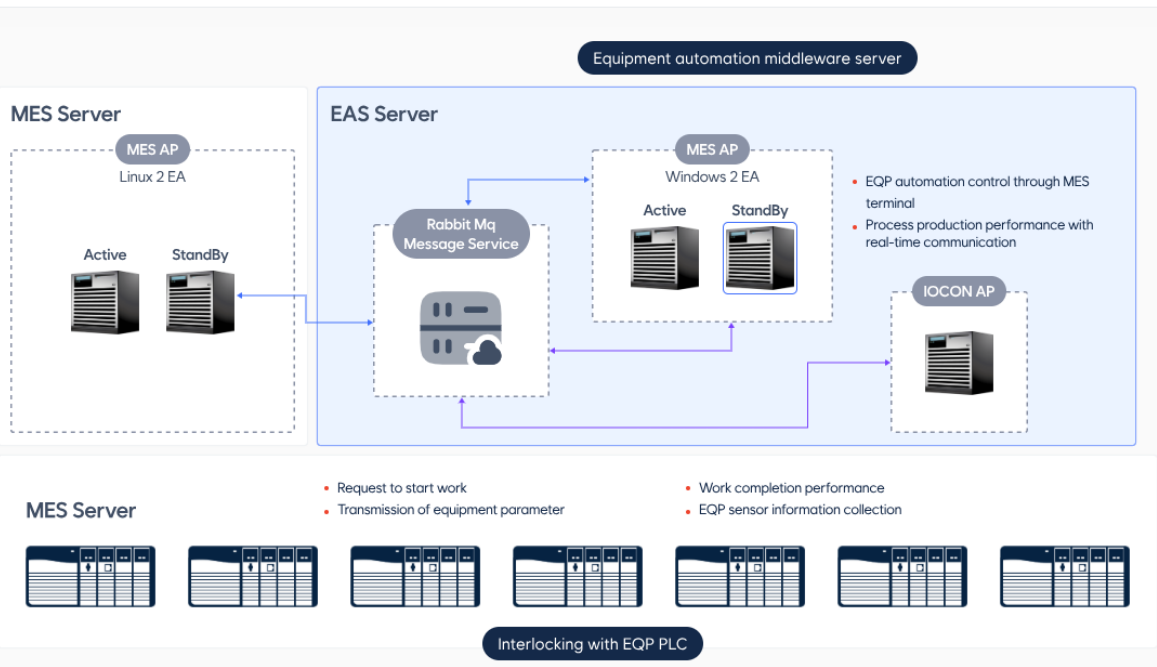


Interface Type Comparison

Item	DB TO DB	Related Adapter
Time Cycle	Batch	Real Time
Related products	Local ERP, WMS etc.	SAP, Oracle ERP

11 Equipment Interface

- Automation controlled by the user through the MES terminal
- Sends the parameters required for equipment operation to the equipment PLC and initiates operation upon receiving a start request



Key Features

- It is necessary to review the issuance and attachment of ID labels for each material.
- Real-time traceability and erroneous input prevention possible
- Method verified through other companies implementation cases
- Applicable to work-in-progress LOT in all processes other than finished products

Issue

- It is necessary to review whether the ID label is issued and managed in the actual field situation.
- Prior verification of operator convenience is required.