ABOUT ME

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Solution Director & Engineering Unit Head, Smart Factory Intelligent Operation – CoE - Global Engineering Center - India

Engineering degree in Instrumentation & Control

- 24 years experience in consulting, solution architecting, program management and Industrialization of services
- **Focused Area :** Digital Manufacturing, Smart Factory, Industrial IOT, MOM, Industry 4.0, Cloud – Azure, AWS, Solution, Consulting, Presales
- Discrete and Process Industries - CPG / Steel/ Automotive / Aerospace / Life Science
- International exposure – India, Europe, USA, Southeast Asia

AGENDA

01 OVERVIEW

02 OBJECTIVES

03 KEY CONSIDERATIONS

04 APPROACH

05 CASE STUDY

PAPERLESS OPERATION

MANY OF OUR CUSTOMERS HAD ACHIEVED SIGNIFICANT VALUE AND FASTER ROI THROUGH PAPER LESS AND DATA DRIVEN OPERATION

Cost of Information delay and Leakage

- Higher safety stock due to unclear real time inventory view
- Low utilization due to Machine down incident not known
- Low grade product or scrap produced due to specification not known
- Skilled person spending efforts to record data
- High repair (MTTR) time due to non availability step-by-step work instruction for the job

Business Benefit Realized*

Semi-finished goods waste reduction

Inventory reduction

Yearly savings on spare parts and maintenance costs

Machine utilization / OEE

Energy reduction

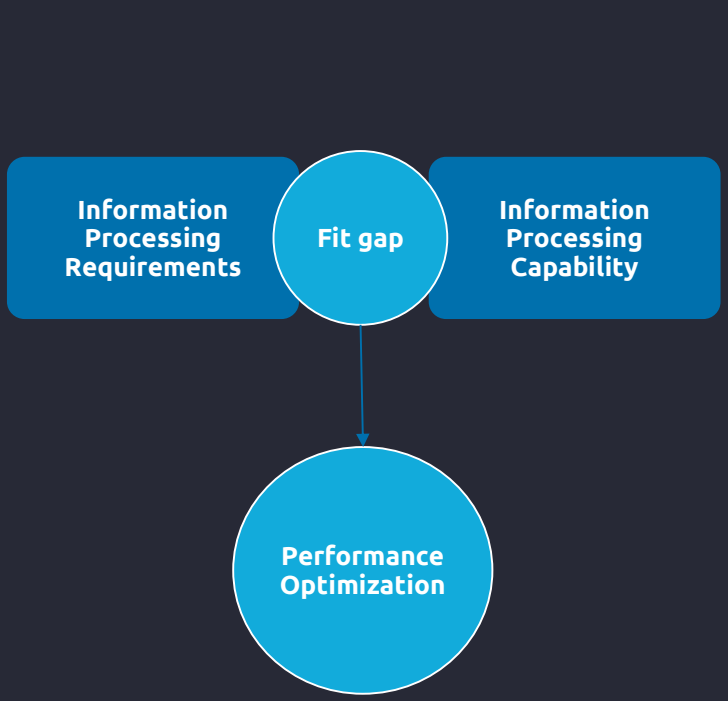
eBR Review Time, / Frist time right

Person efforts /day

Speed | **Efficiency** | **Quality** | **Cost** | **Flexibility**

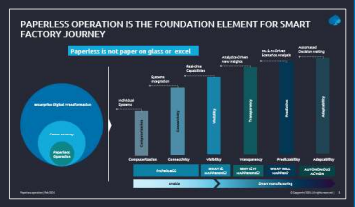
*Approximate

MULTI DIMENSIONAL OBJECTIVES TO BE CONSIDERED FOR PAPERLESS OPERATION JOURNEY



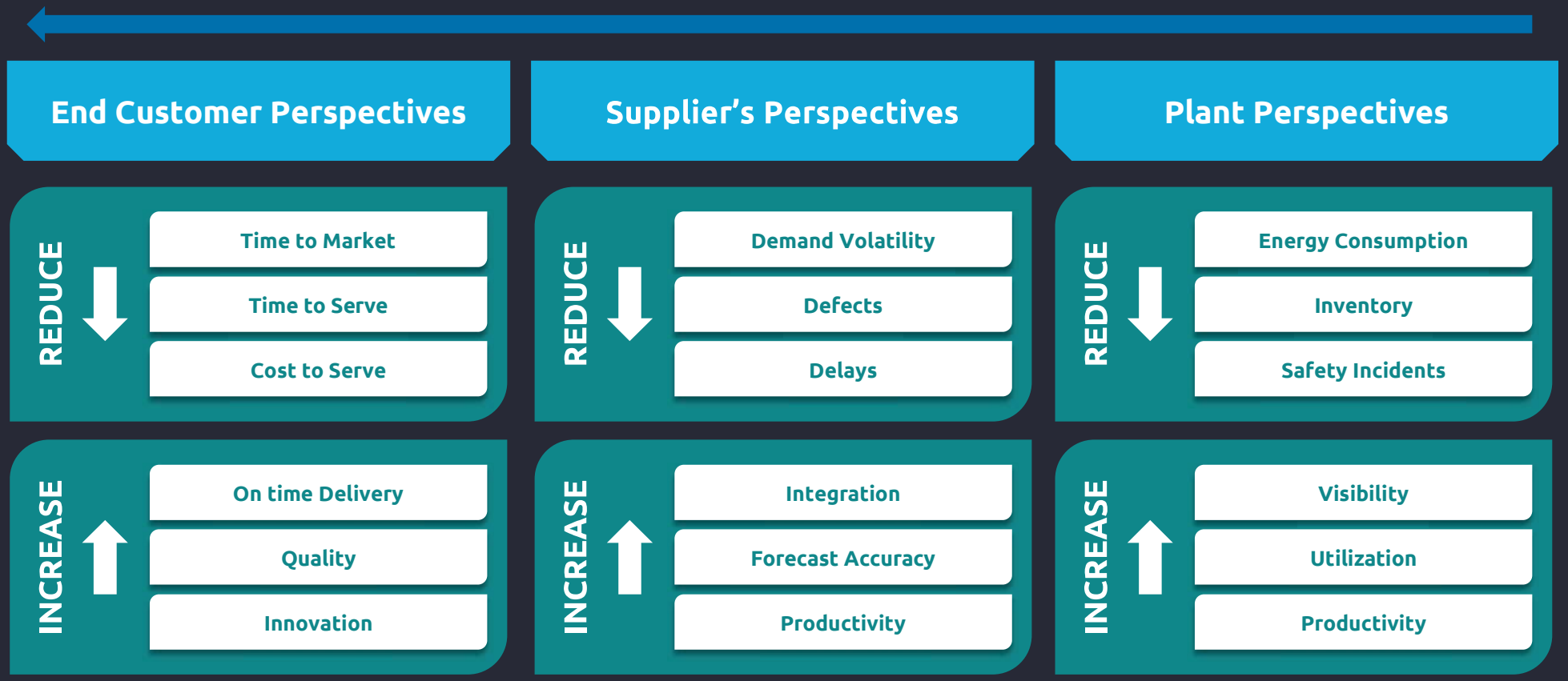
Business Performance Improvement

Digital Transformation



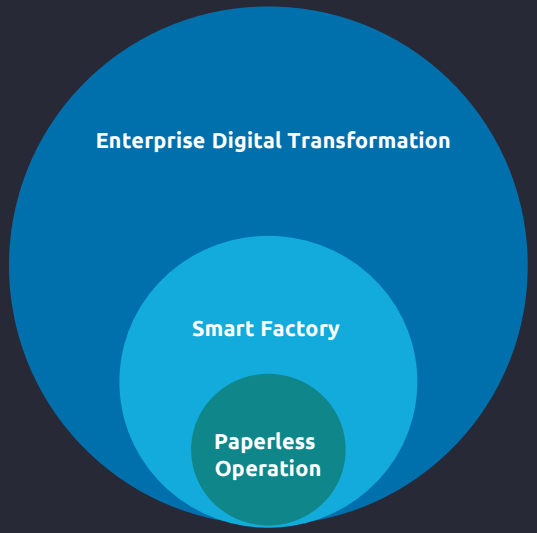
Process & Regulatory Compliance

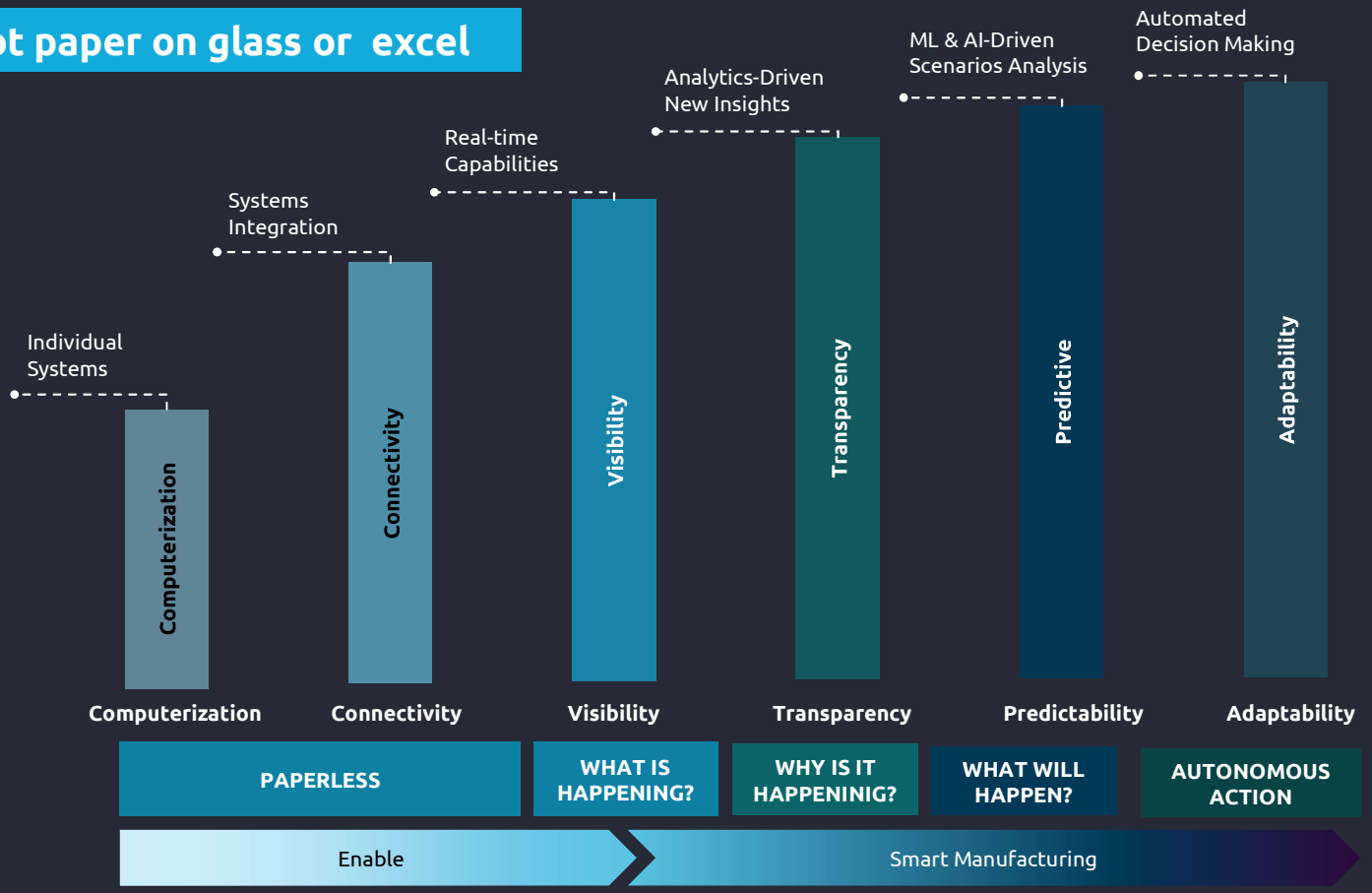
DIGITISATION OF SHOP FLOOR FUNCTIONS HELPS IN OVERALL OF OPTIMISATION OF THE END-TO-END SUPPLY CHAIN AND RESULTS IN HAVING SATISFIED CUSTOMERS



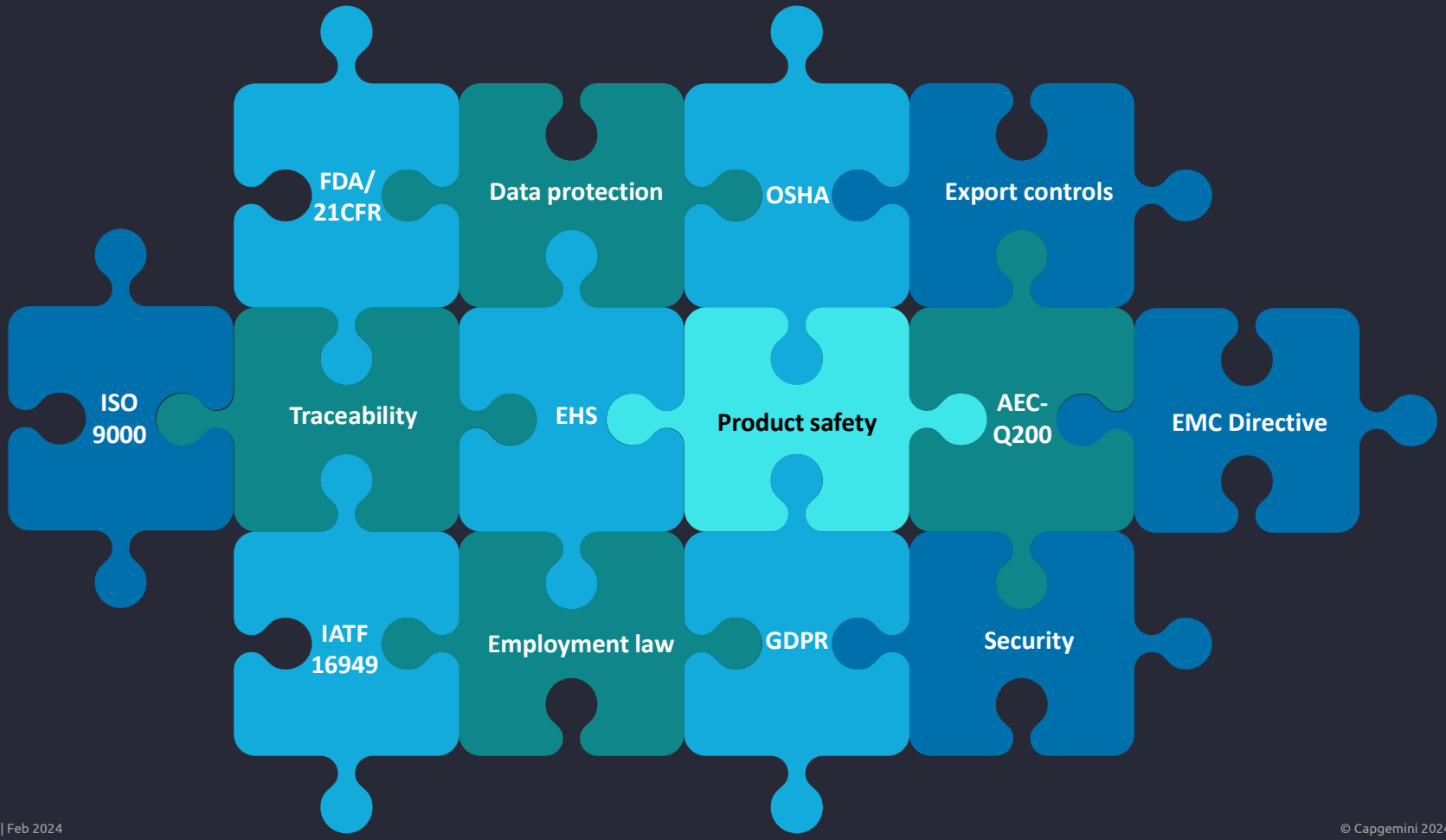
PAPERLESS OPERATION IS THE FOUNDATION ELEMENT FOR SMART FACTORY JOURNEY

Paperless is not paper on glass or excel





PAPERLESS OPERATION HELPS TO REDUCE OVERHEAD ASSOCIATED WITH REGULATORY COMPLIANCE



USE CASE AND INDUSTRY FRAMEWORK DRIVEN APPROACH ACCELERATE IMPLEMENTATION AND REDUCE RISK

PRODUCTION

- Process / Route configuration
- Production Planning & Scheduling
- Work order/Batch Creation & Release
- Work order/Batch Execution
- Electronic work instruction
- Production Data Collection
- Material consumption & tracking
- Traceability & Genealogy

QUALITY

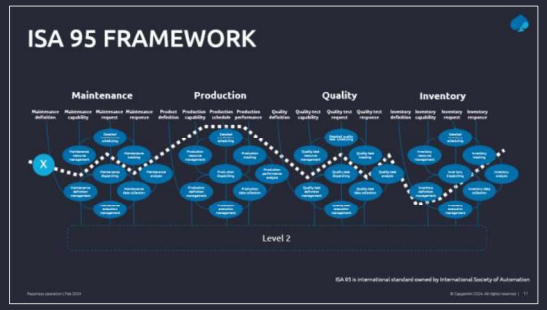
- Production/ In process inspection
- In line Quality data collection
- Sample Management
- Lab Information Management
- Quality Release
- Non conformance& Defect tracking
- Rework racking
- Issue Escalation

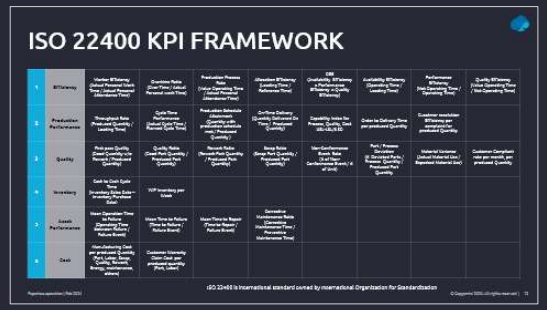
INVENTORY

- Goods receipt
- Material Replenishment
- Inventory reconciliation
- Warehouse management
- Shipping & Dispatching

MAINTENANCE

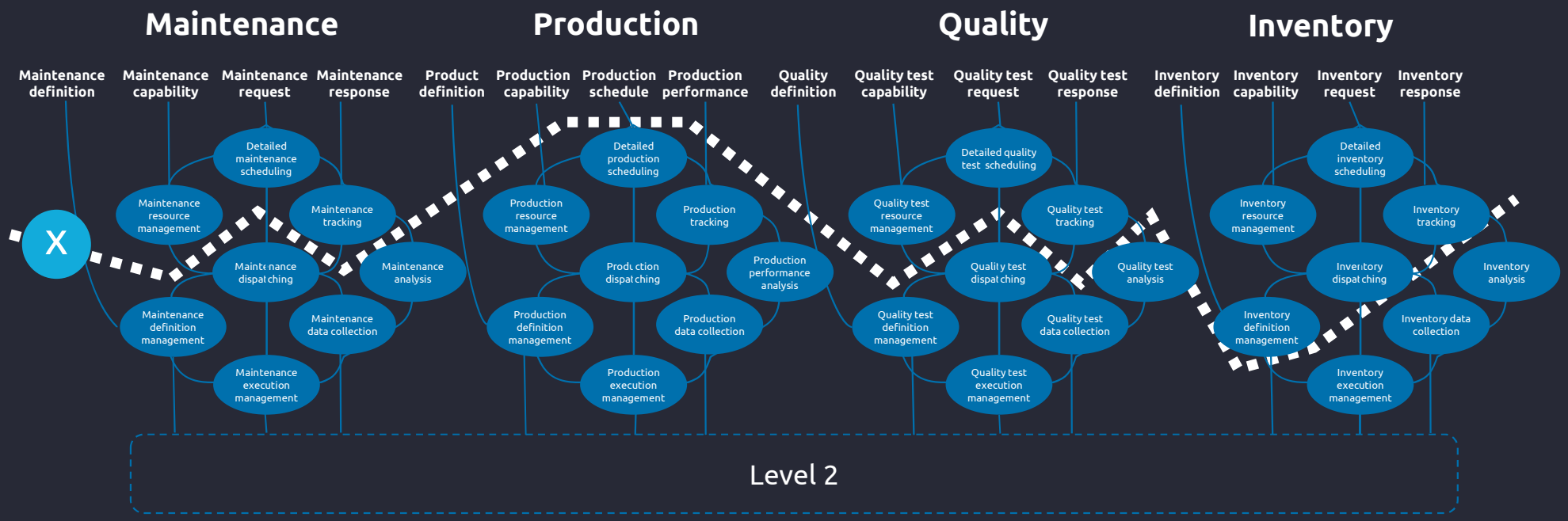
- Maintenance work order management
- Work order execution tracking
- Preventive / Reactive Maintenance
- Cleaning, Inspection Lubrication management
- Connected worker
- Asset performance data collection





Manufacturing performance & Intelligence (Visibility, Transparency and Analysis)

ISA 95 FRAMEWORK



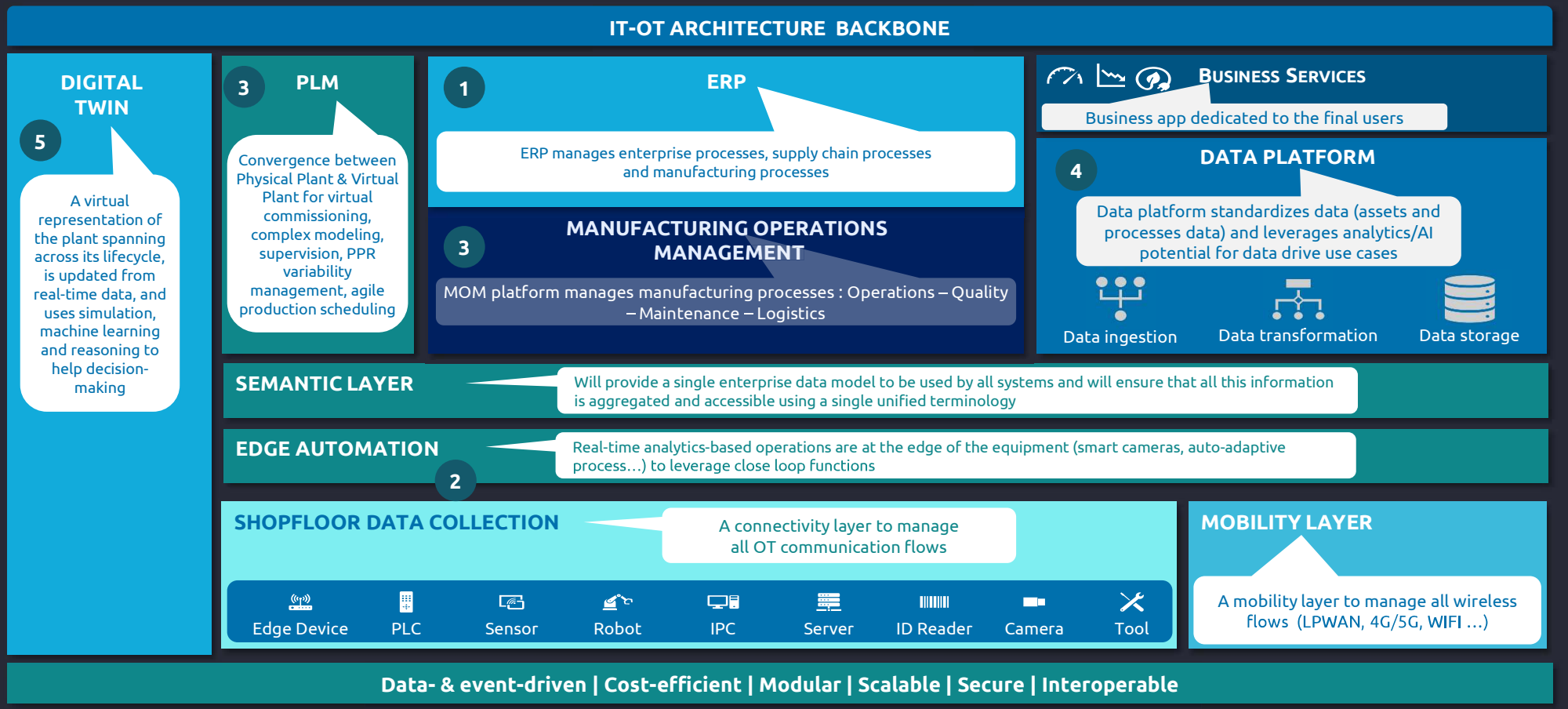
ISA 95 is international standard owned by International Society of Automation

ISO 22400 KPI FRAMEWORK

1	**Efficiency**	Worker Efficiency (Actual Personal Work Time / Actual Personal Attendance Time)	Overtime Ratio (Over Time / Actual Personal work Time)	Production Process Rate (Value Operating Time / Actual Personal Attendance Time)	Allocation Efficiency (Loading Time / Reference Time)	OEE (Availability Efficiency x Performance Efficiency x Quality Efficiency)	Availability Efficiency (Operating Time / Loading Time)	Performance Efficiency (Net Operating Time / Operating Time)	Quality Efficiency (Value Operating Time / Net Operating Time)
2	**Production Performance**	Throughput Rate (Produced Quantity / Loading Time)	Cycle Time Performance (Actual Cycle Time / Planned Cycle Time)	Production Schedule Attainment (Quantity with production schedule met / Produced Quantity)	On-Time Delivery (Quantity Delivered On Time / Produced Quantity)	Capability Index for Process, Quality, Cost USL-LSL/6 SD	Order to Delivery Time per produced Quantity	Cusotmer resolution Efficiency per complaint for produced Quantity	
3	**Quality**	First pass Quality (Good Quantity w/o Rework / Produced Quantity)	Quality Ratio (Good Part Quantity / Produced Part Quantity)	Rework Ratio (Rework Part Quantity / Produced Part Quantity)	Scrap Ratio (Scrap Part Quantity / Produced Part Quantity)	Non-Conformance Event Rate (# of Non-Conformance Event / # of Unit)	Part / Process Deviation (# Deviated Parts / Process Quantity / Produced Part Quantity	Material Variance (Actual Material Use / Expected Material Use)	Customer Compliant rate per month, per produced Quantity
4	**Inventory**	Cash to Cash Cycle Time (Inventory Sales Date – inventory Purchase Date)	WIP Inventory per Week						
5	**Asset Performance**	Mean Operation Time to Failure (Operating Time between Failure / Failure Event)	Mean Time to Failure (Time to Failure / Failure Event)	Mean Time to Repair (Time to Repair / Failure Event)	Corrective Maintenance Ratio (Corrective Maintenance Time / Preventive Maintenance Time)				
6	**Cost**	Manufacturing Cost per produced Quantity (Part, Labor, Scrap, Quality, Rework, Energy, maintenance, others)	Customer Warranty Claim Cost per produced quantity (Part, Labor)						

ISO 22400 is international standard owned by International Organization for Standardization

A BEST-OF-BREED ARCHITECTURE, FOR REAL-TIME DATA PROCESSING, STRONG ANALYTICAL CAPABILITIES & EVENT-DRIVEN OPERATIONS



CHALLENGES

EMPLOYEE ADOPTION

- Acceptance of change in responsibilities
- Training & Mentoring

INFRASTRUCTURE & INTEGRATION

- Infrastructure capabilities
- Infrastructure maintenance capabilities
- Legacy systems

COST / ROI

- Measurement and calculation approach
- Expectation of early cost recovery

TOP-DOWN APPROACH, MANAGEMENT COMMITMENT, SOFTWARE AS A SERVICES, PAY AS YOU GO MODEL

CASE STUDIES

DISCRETE INDUSTRIES

↓lead time

+machine utilization

Capabilities

- Real time monitoring
- Shop Floor connectivity
- Scheduling
- Work order execution
- Quality Data collection
- Material Replenishment & Tracking
- Exception handling
- Downtime/ OEE Analysis

LIFE SCIENCE

Simplification
Automatization
Standardization

SIMPLIFICATION | STANDARDIZATION | BLOCK EDITING | DEPLOYMENT

25 processes | 600 blocks

Change Management | Block Factory and core model

Automation, data science

Project Management and Governance

Packaging
Filling Isolator
Purification
Compounding
Visual Inspection

1 Process Mapping
2 Data criticality Analysis
3 Key principles validation
4 Target BR design & validation
5 Functional Architecture definition

Real case results on ≈ 15000 data records analysis (sterile vaccine manufacturing)

≈ 50 % of non-critical data deleted

After workshops with internal teams

+50 Sites worldwide

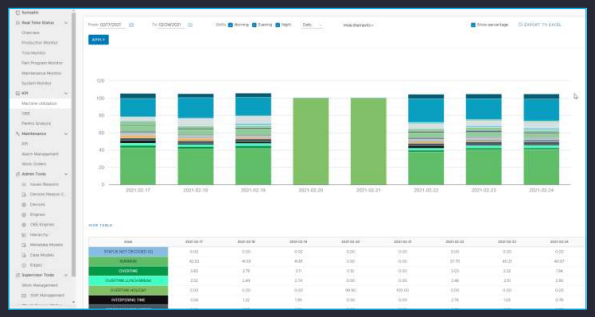
25 Processes covered

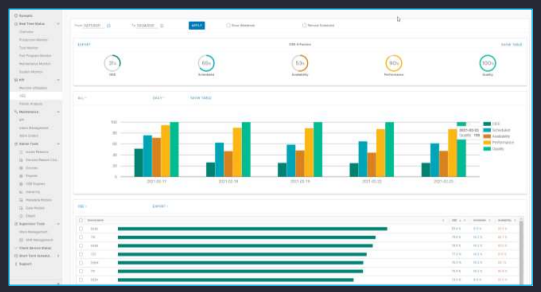
+5000 users

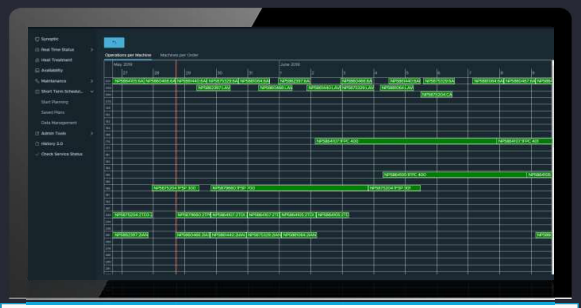
3-5 years Payback

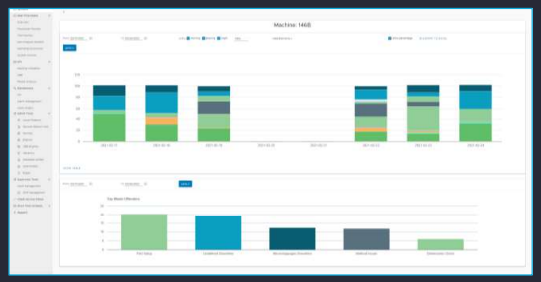
2 years Deployment

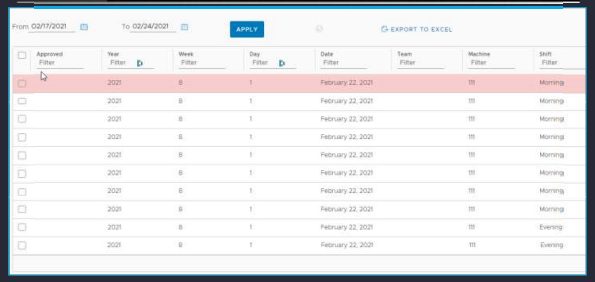
DISCRETE INDUSTRIES











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5. **Functional Architecture definition**

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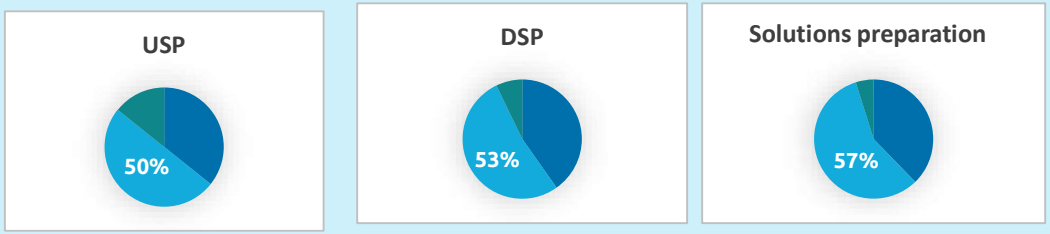

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