

# Digital Transformation Program

## Digital Twin & Predictive Maintenance

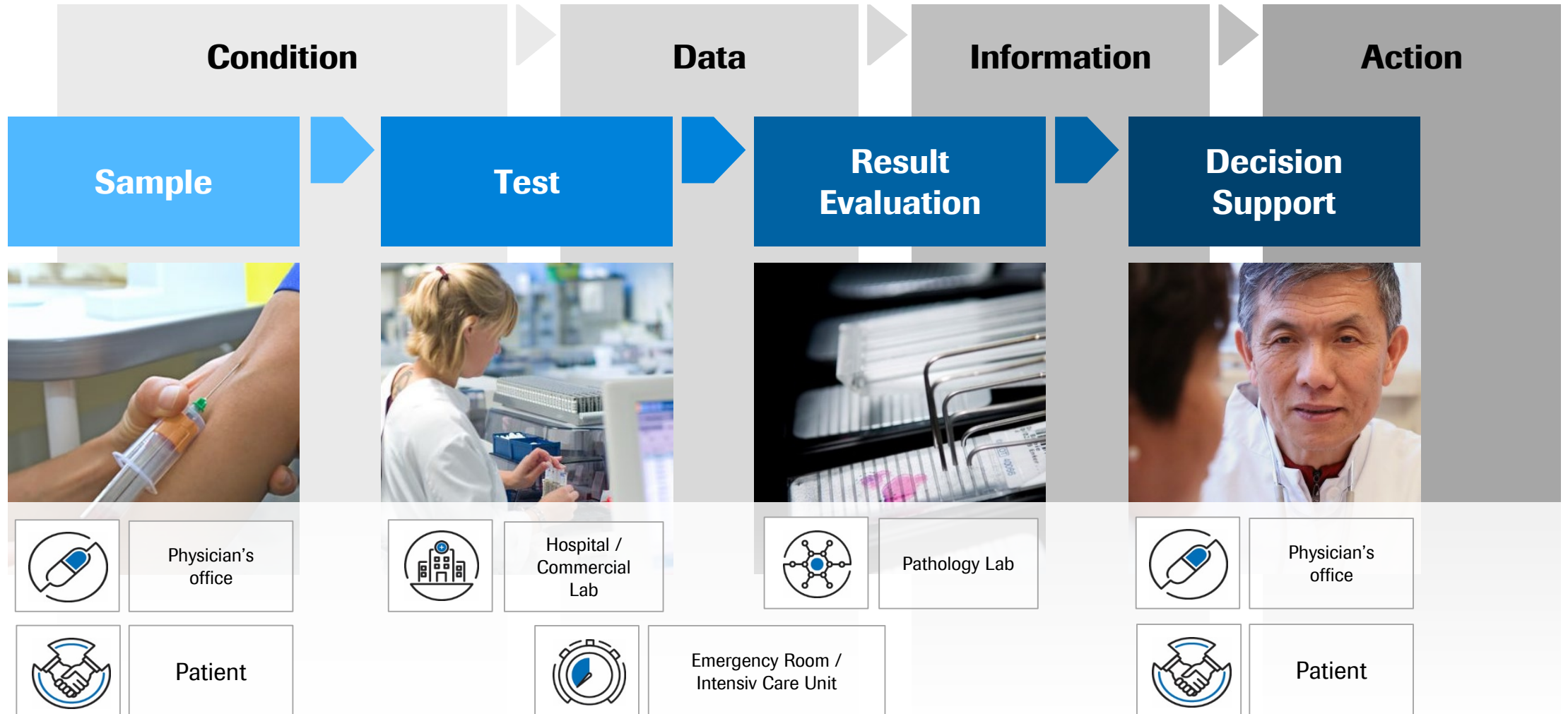
September, 4<sup>th</sup> 2018

*Peter Wyser, Head of Digital Transformation*



# The value of in vitro diagnostics

## *Transforming data into actionable information*



# In Vitro Diagnostic (IVD) Analyzer

## *Example of cobas®6800 – Molecular Diagnostics*

📄 Scanning of each rack and single sample barcode.  
Order test request from Lab IT

🧬 DNA/RNA extraction and test preparation

➡ Polymerase Chain Reaction (PCR) and detection of viral load by multiplying DNA/RNA and recalculation of original concentration

📄 Input/output of patient blood sample tubes/racks



in 8 hours

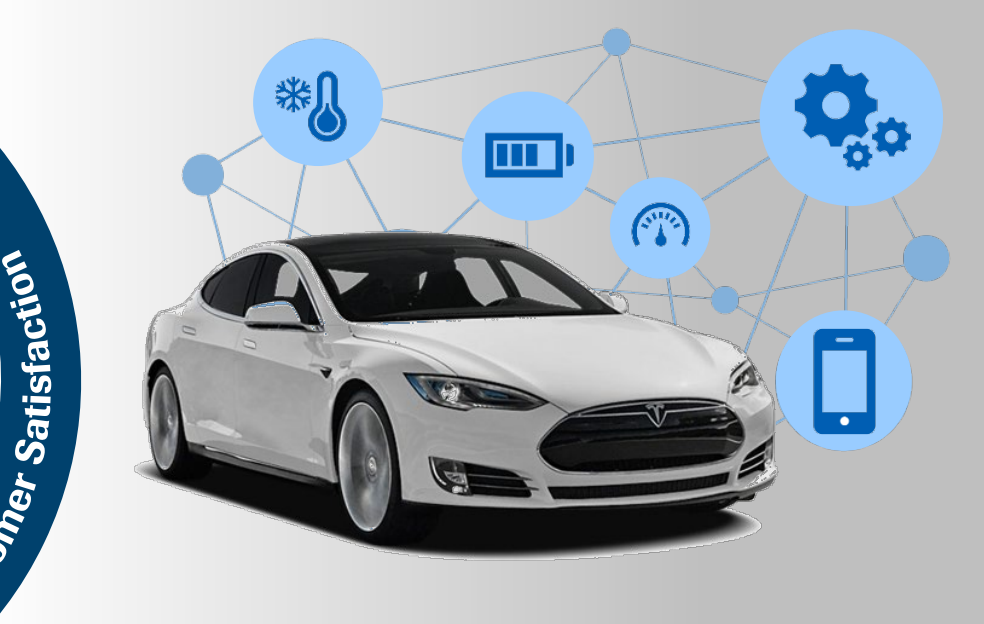
384 Samples





# Digital Transformation Program

## *Predictive Maintenance*

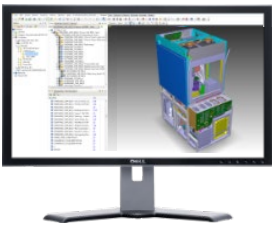


# Digital Transformation for Roche Diagnostics



## Product Structure Management

Lead System Engineer / Configuration Manager

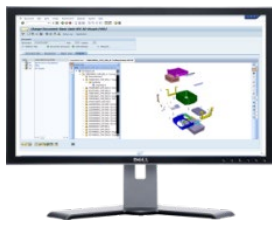


- Functional Baselining
- Configuration Management 3D



## Manufacturing / QC / Logistics

Instrument Manager / Quality Engineer



- 3D assembly guidelines
- 3D Printing (AM)
- 3D Inspection Plan
- Mobile Maintenance



## Product Quality Management

CIR Quality Manager



- Global Quality Dashboard 360
- Quality Doc. Generation
- Visualized Quality Monitoring



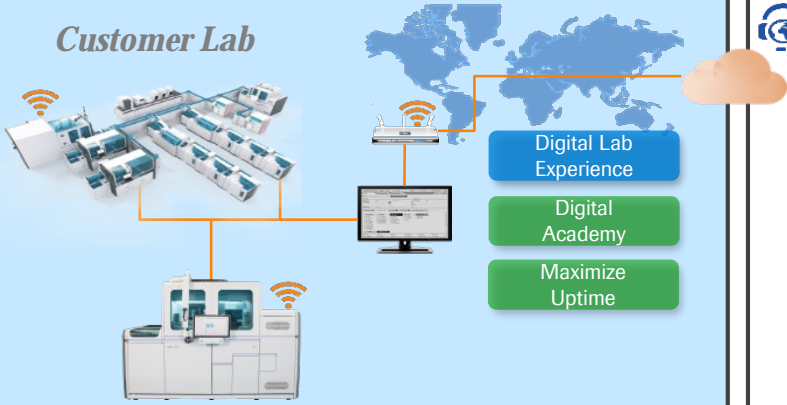
## Engineering

System Engineer



- 3D Visual Engineering
- Object Based Requir. Management
- Simulation Driven Design

## Customer Lab



- Digital Lab Experience
- Digital Academy
- Maximize Uptime



## Remote Support

Call Agent / System Expert



- Digital Twin
- Instrument & LAB Configuration 360
- Condition Monitoring



## Business Analytics

Business Analyst / Sales Force



- 3D Visual Analytics
- PLC (Product Lifecycle Costing)
- Asset Efficiency



## Sales & Marketing

IBL / Lab Consultant / Sales Force



- Workflow Simulation
- Digital Min. Viable Product
- Customer Feedback Loop
- Digital Learning



## On Site Service

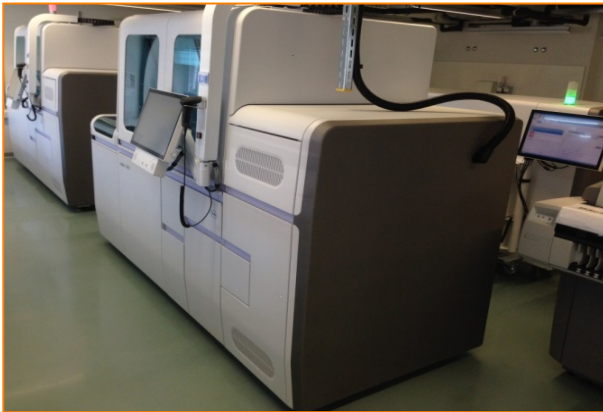
Field Service Engineer



- Digital Supported Service
- 3D animated Service Instructions
- 3D Spare Parts Catalogue
- Predictive Maintenance

# Digital Twin

## *Definition of Components and Purpose*



**Physical Product**

### Physical Product

Is represented by:

- Specific **Configuration** *as build and as maintained*
- **Specific Condition** *depending on aging and issues on internal components*



**Digital Twin**

### Digital Twin

Is represented by:

- **Generic virtual Model** based on CAD data and simulation
- **PLM based configuration**; Physical, electronical and SW information
- **Specific condition** based on internal sensor and counter data, event protocols, enriched with new information from additional sensors and unstructured data

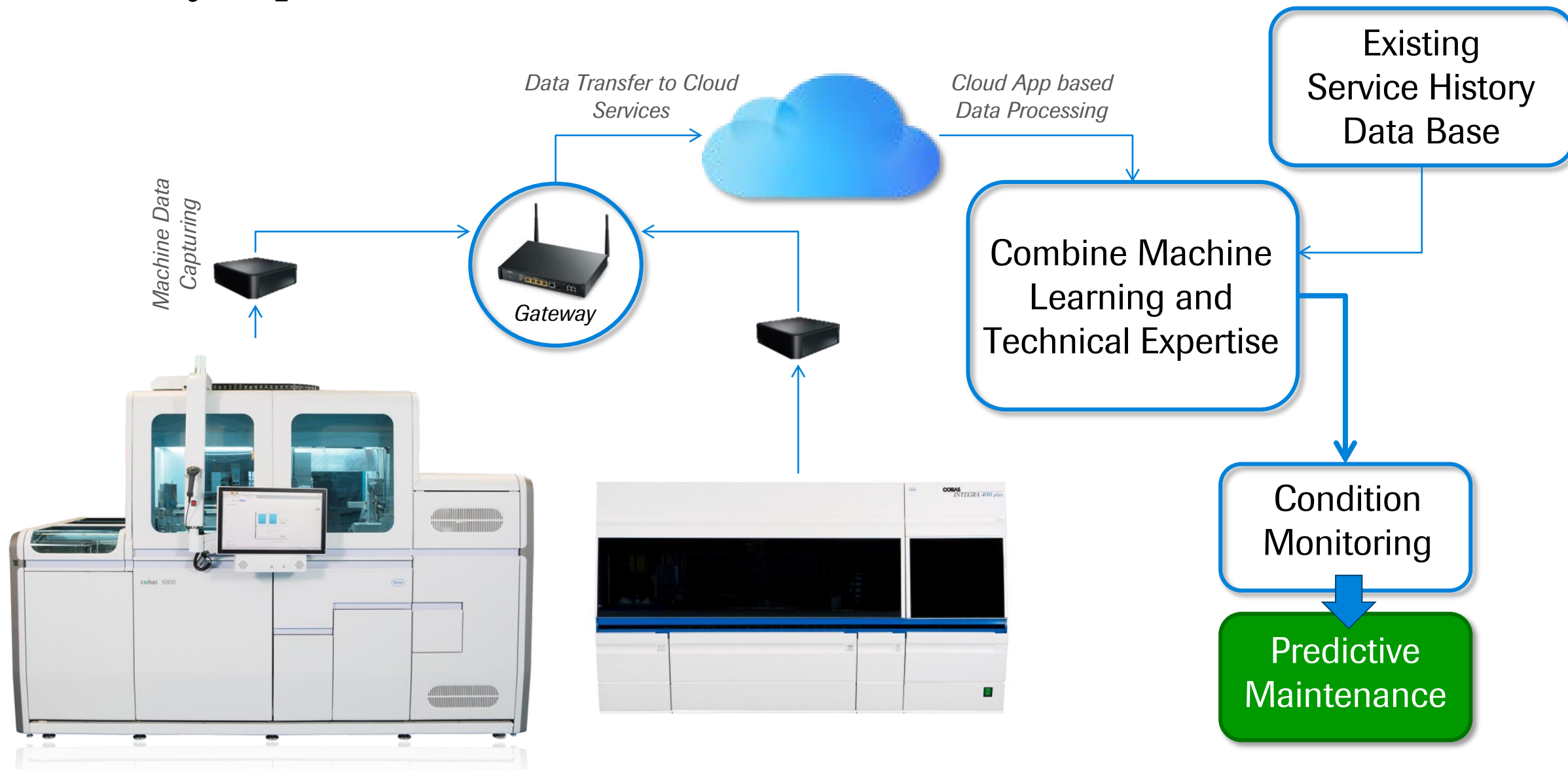
### Digital Twin Solutions

Are performed based on the **appropriate Digital Twin** and used to:

- Visualize as user interface the real product for **remote service**
- Monitor condition for **predictive maintenance**
- **Operator Feedback** on usability and functionality

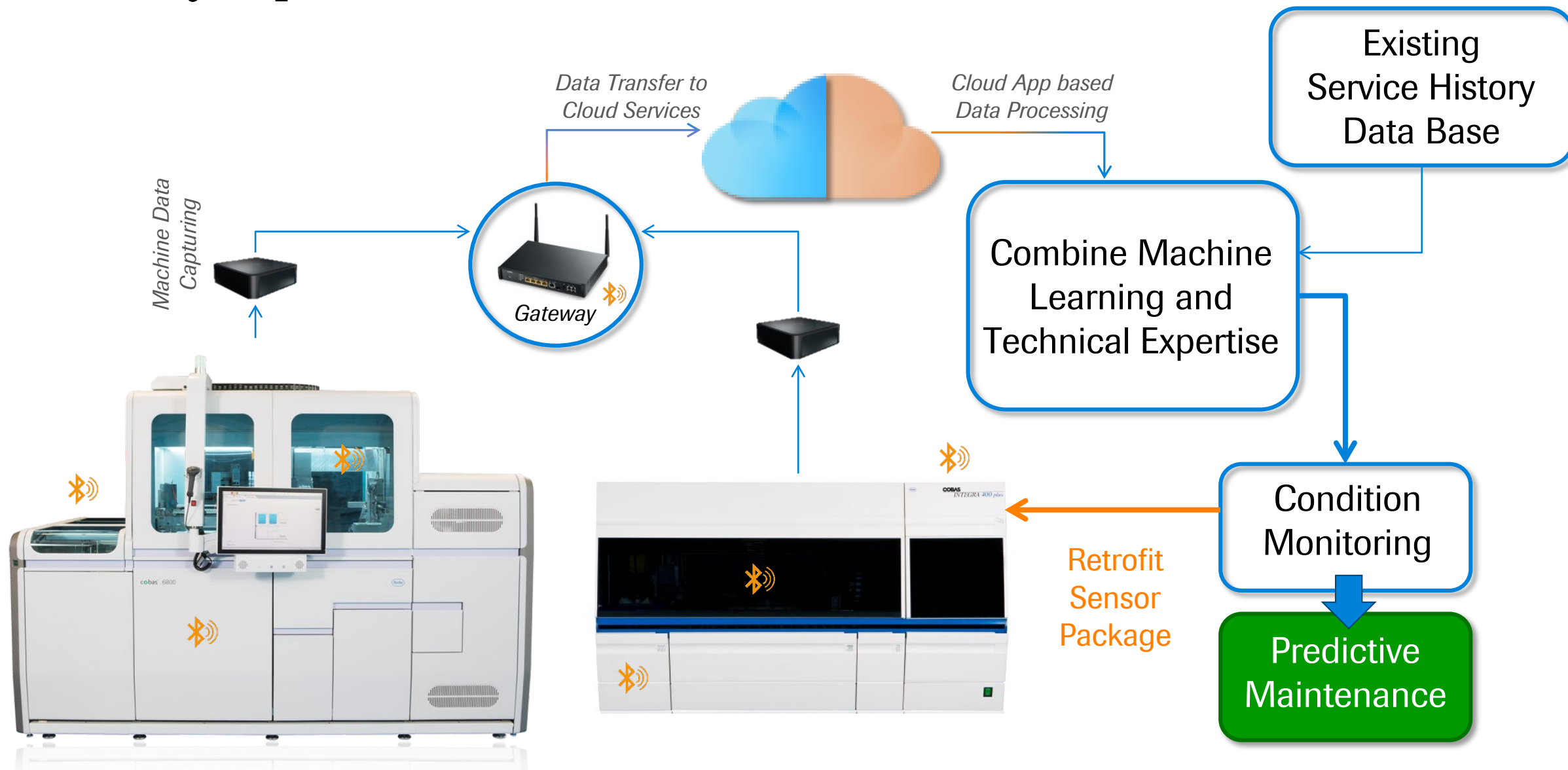
# Digital Transformation Program

## *Pathway to predictive maintenance*



# Digital Transformation Program

## *Pathway to predictive maintenance*





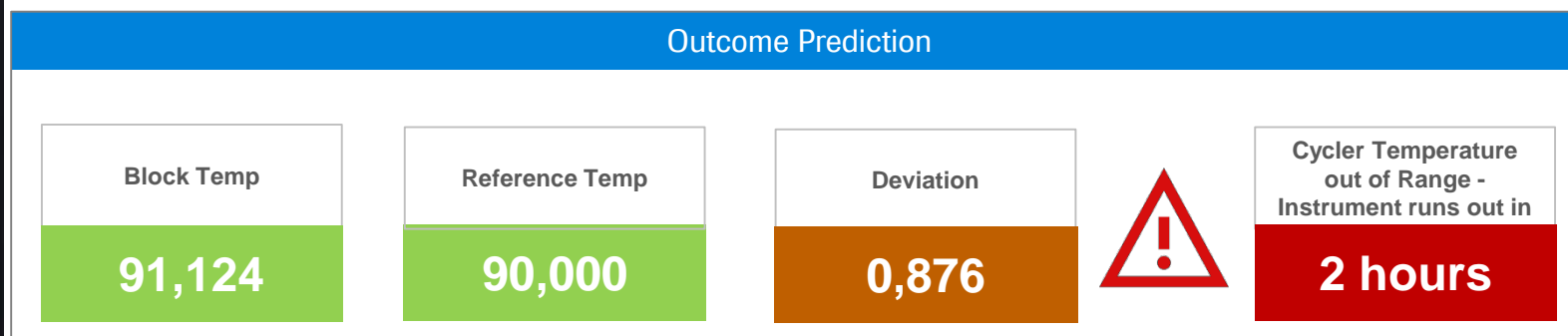
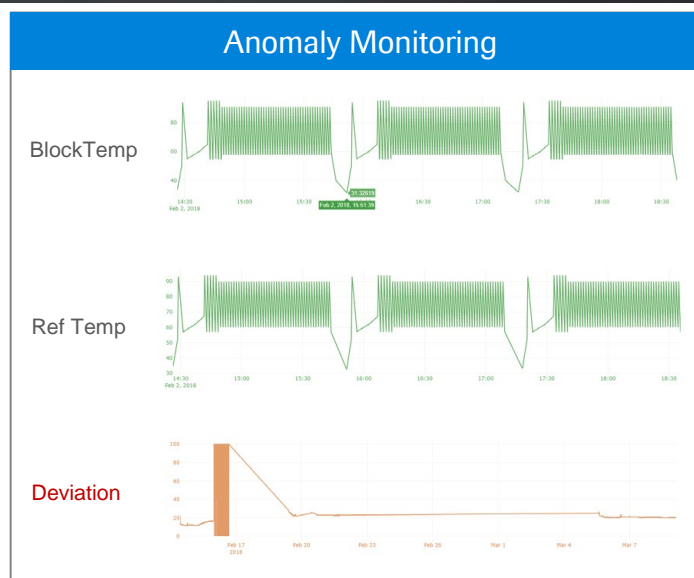
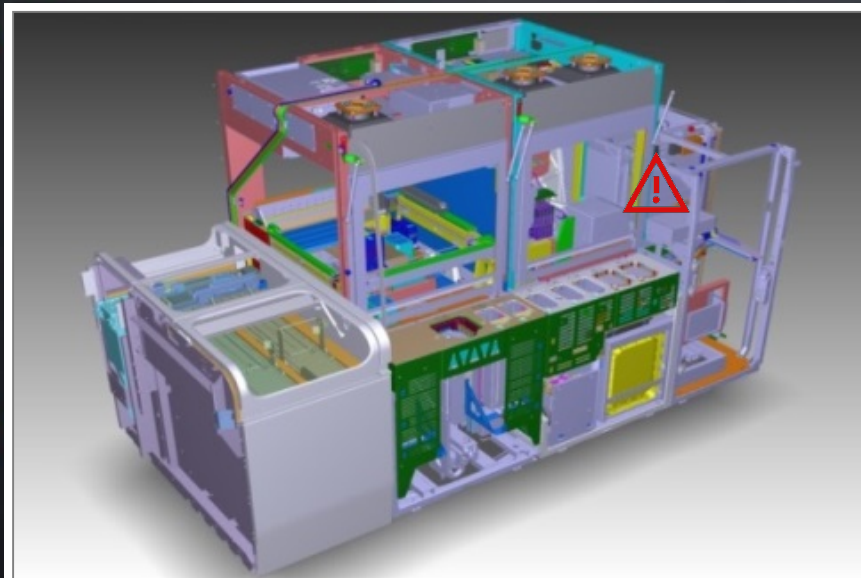
# Digital Transformation Program

## *Predictive Maintenance*



# Digital Transformation Program

## *Machine Learning in Predictive Maintenance*



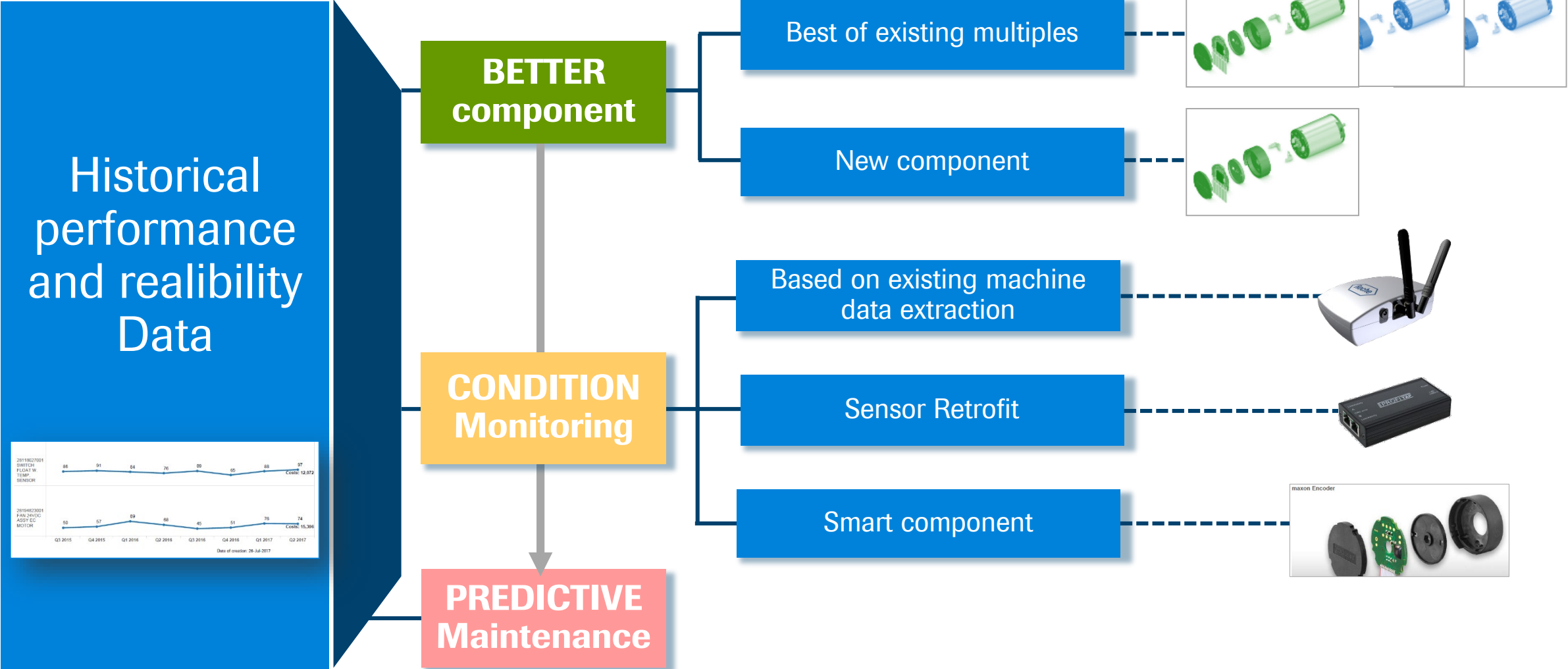
- Sensor Signals
- Service History
- Error Codes
- Environment Status
- ..

Identify **Key Parameters** for  
**condition monitoring** &  
their Contribution to **Failure  
Prediction**

**Failure Prediction**  
for Equipment  
(Requires Historic Data)

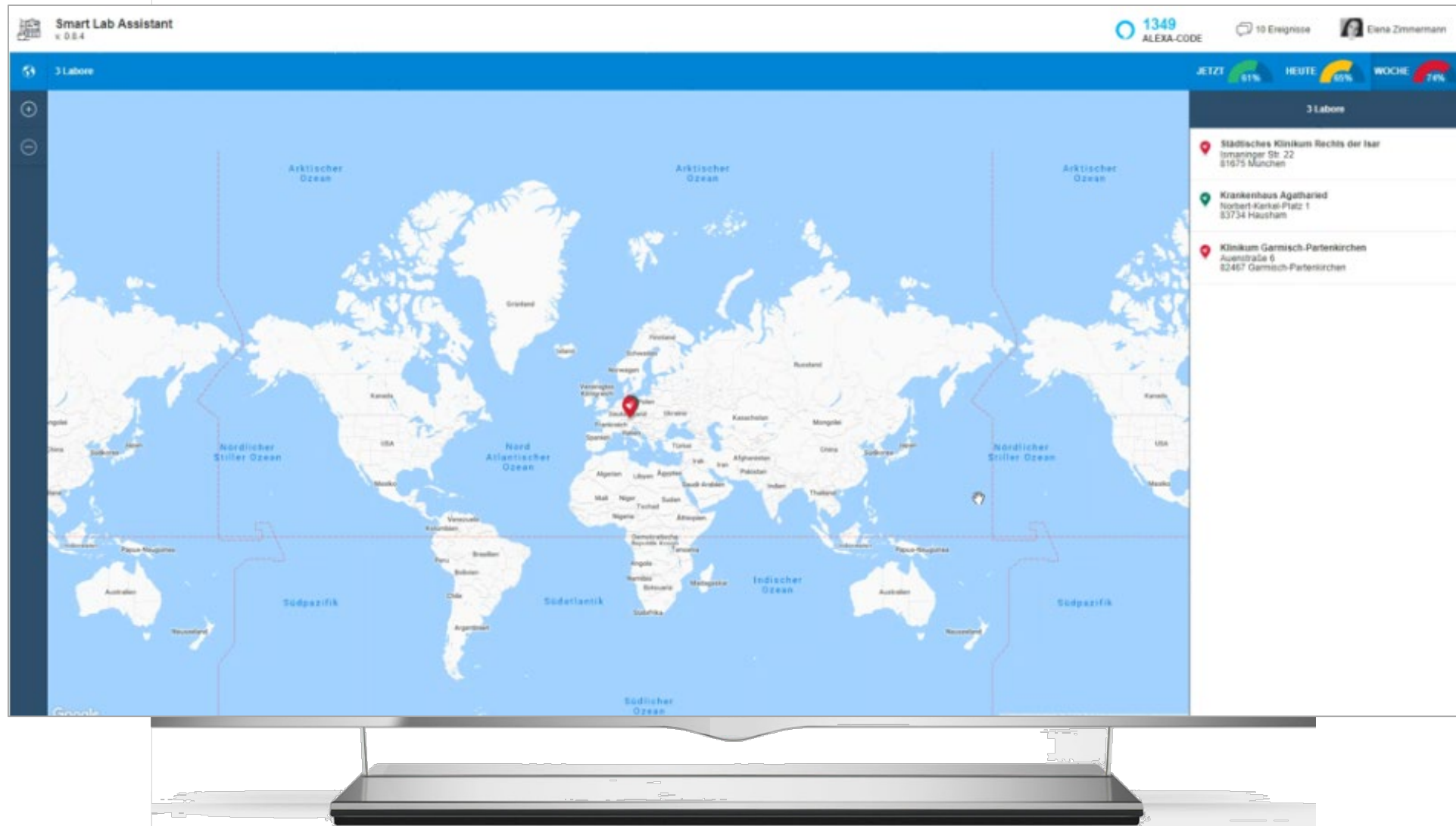
# Increase Uptime – Best Parts / Smart Parts

## *Component Reliability Improvement*



# Digital Twin

## *Smart Lab Assistant*





# Digital Transformation for Roche Diagnostics



**Product Structure Management**  
Lead System Engineer / Configuration Manager

Functional Baseline  
Configuration Management

**Manufacturing / QC / Logistics**  
Inventory Management / Quality Feedback

Digital Production Twin

**Product Quality Management**  
CIR Quality Manager

Global Quality Dashboard 360  
Quality Doc. Generation  
Visualized Quality Monitoring

**Engineering**  
System Engineer

Digital Engineering  
Based Requirement Management  
Data Driven Design

Digital Product Twin

**Customer Lab**

Digital Lab Experience  
Digital Academy  
Maximize Uptime

**Remote Support**  
Call Agent / System Expert

Digital Twin  
Test & LAB Simulation 360  
Monitoring

**Business Analytics**  
Business Analyst / Sales Force

3D Visual Analytics  
PLC (Product Lifecycle Costing)  
Asset Efficiency

**Sales & Marketing**  
IBL / Lab Consultant / Sales Force

Workflow Simulation  
Digital Min. Viable Product  
Customer Feedback Loop  
Digital Learning

**On Site Service**  
Field Service Engineer

Digital Performance Twin

Supported Service  
Animated Instructions  
Spare Parts Catalogue  
Predictive Maintenance

***Doing now what patients need next***