

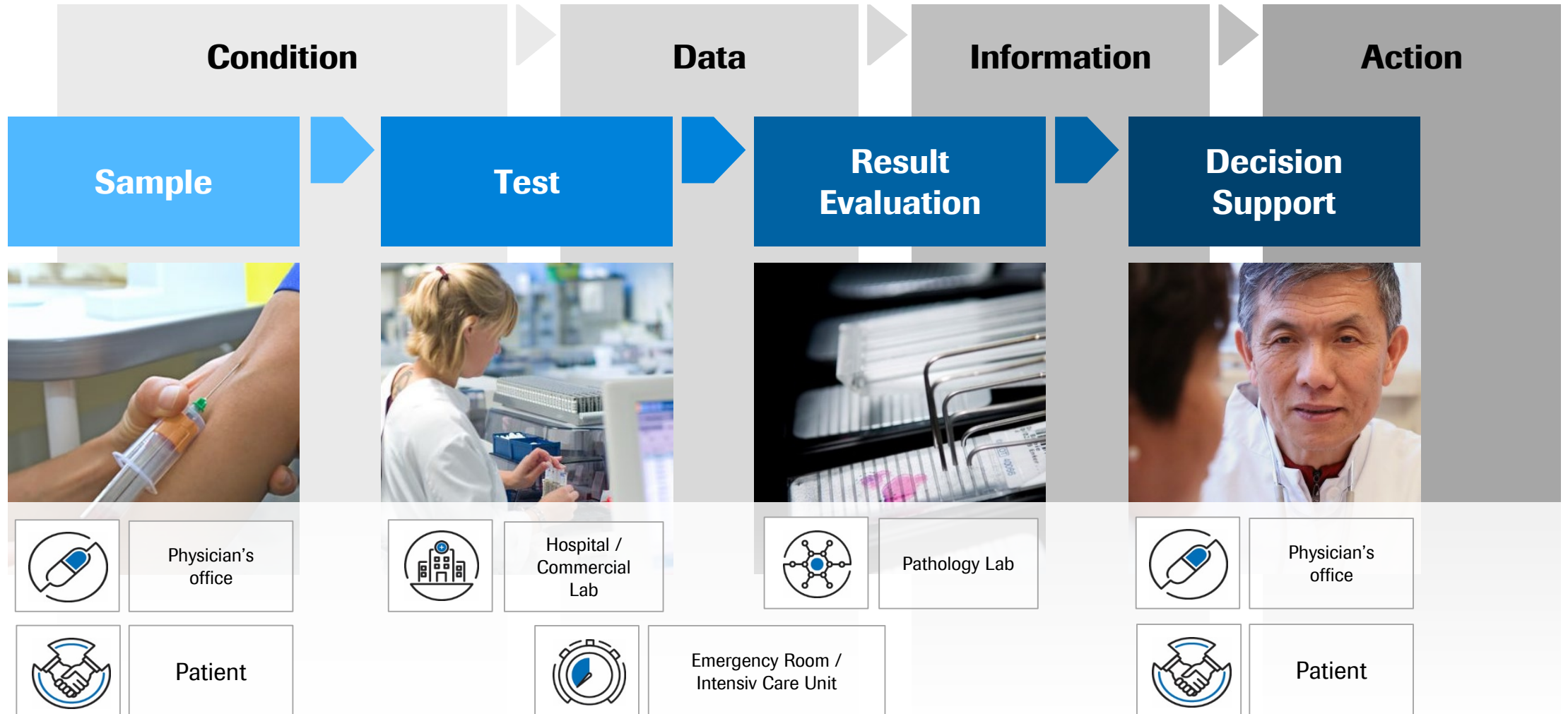
# Digital Transformation Program Digital Twin & Predictive Maintenance September, 4<sup>th</sup> 2018

*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

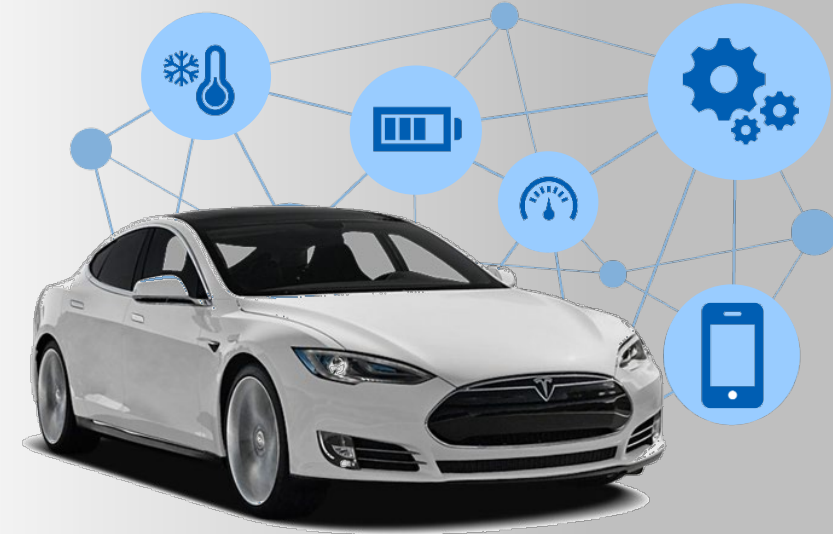
384 Samples





# Digital Transformation Program

## *Predictive Maintenance*



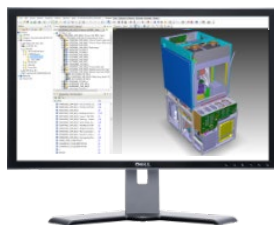
# Digital Transformation for Roche Diagnostics

Roche



## Product Structure Management

Lead System Engineer / Configuration Manager



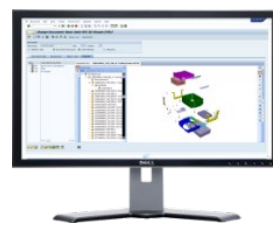
Functional Baseline

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

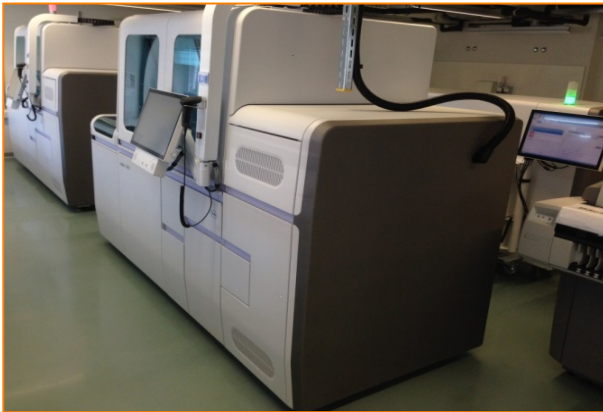
Predictive Maintenance

DTP Scope

Value Creation

# 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, electrical and SW information
- **Specific condition** based on internal sensor and counter data, event protocols, enriched with new information from additional sensors and unstructured data

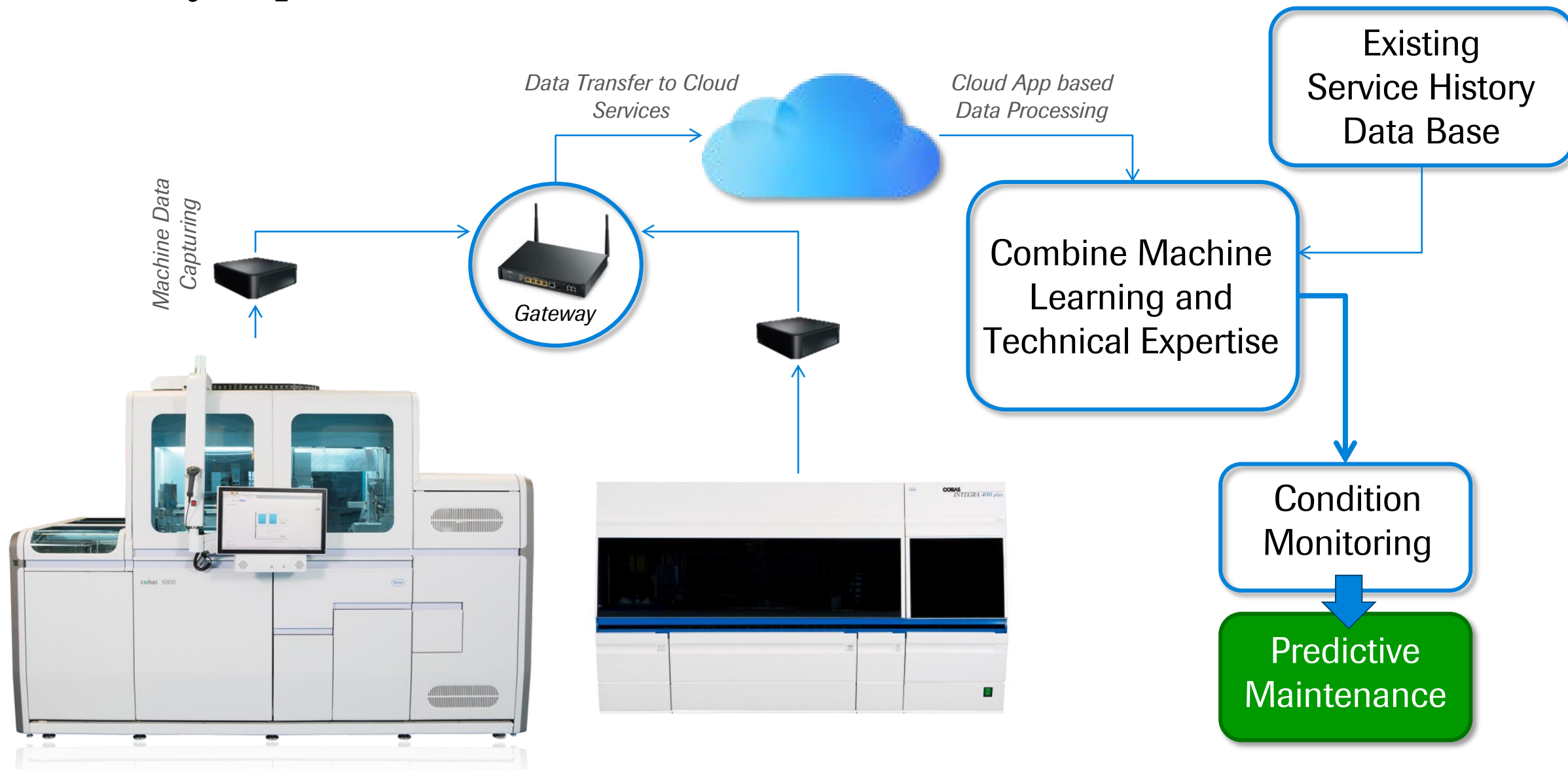
### Digital Twin Solutions

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

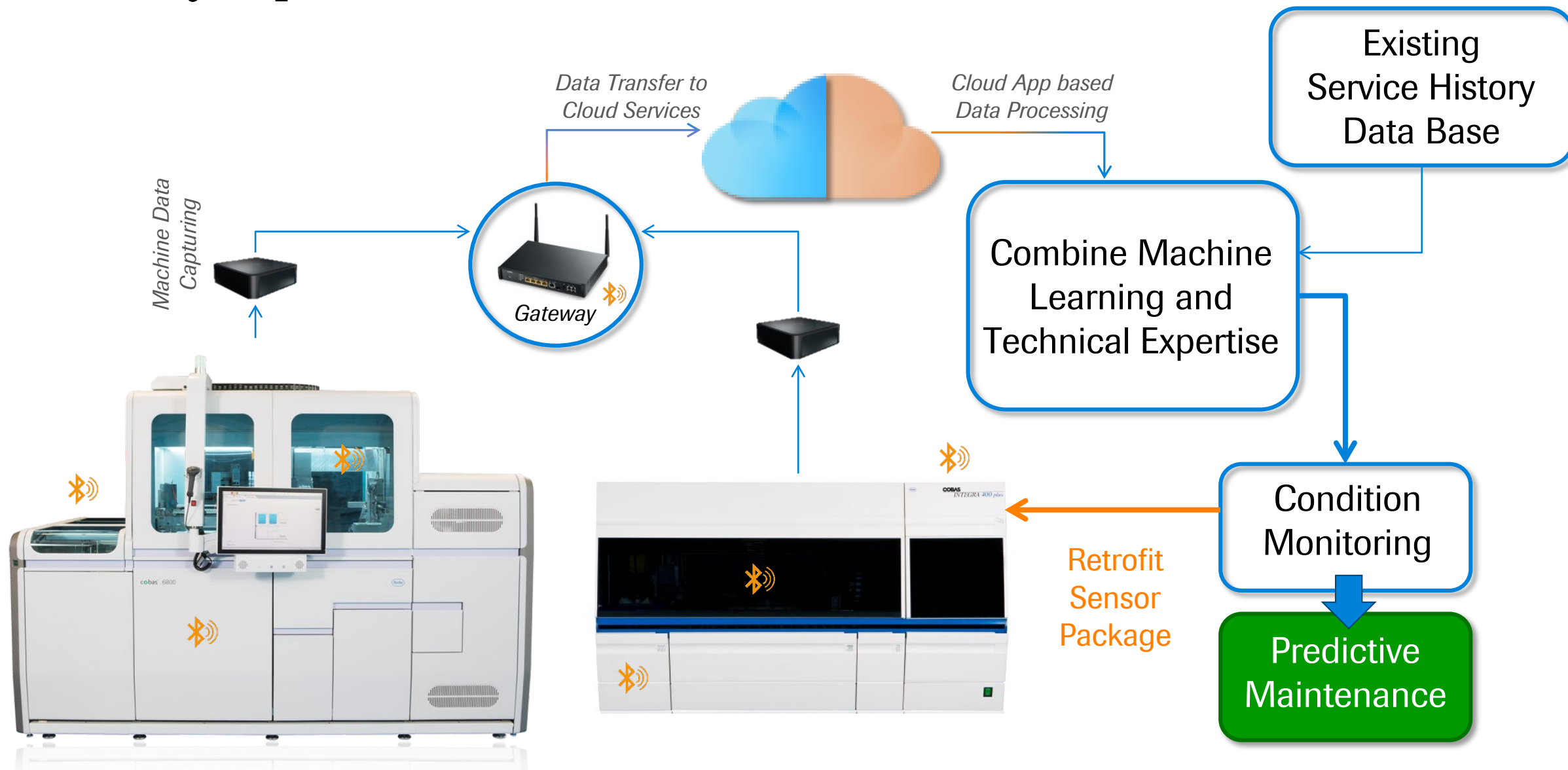
# Digital Transformation Program

## *Pathway to predictive maintenance*



# Digital Transformation Program

## *Pathway to predictive maintenance*





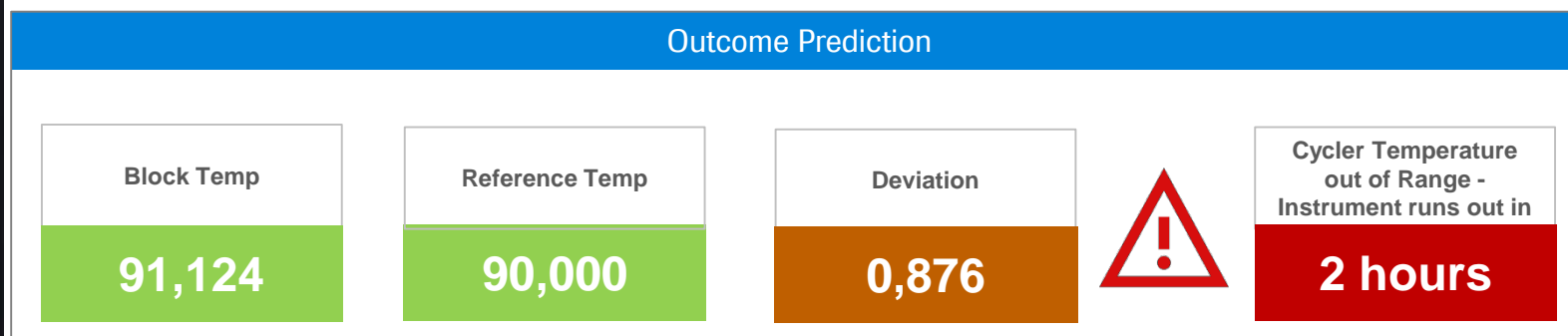
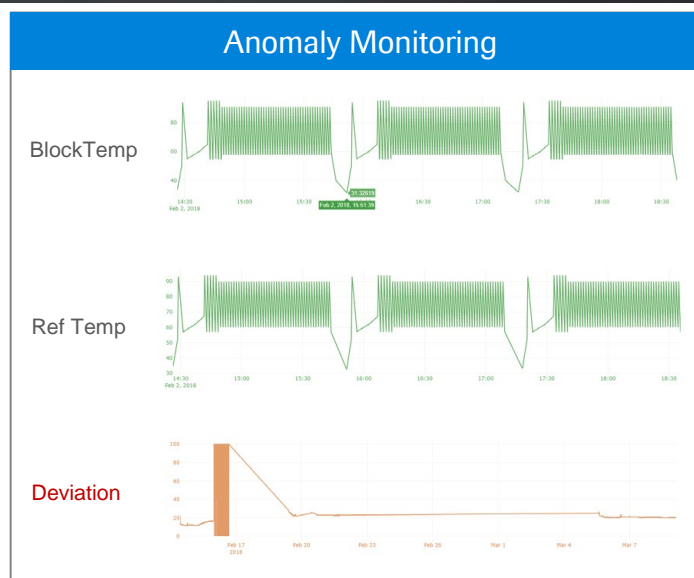
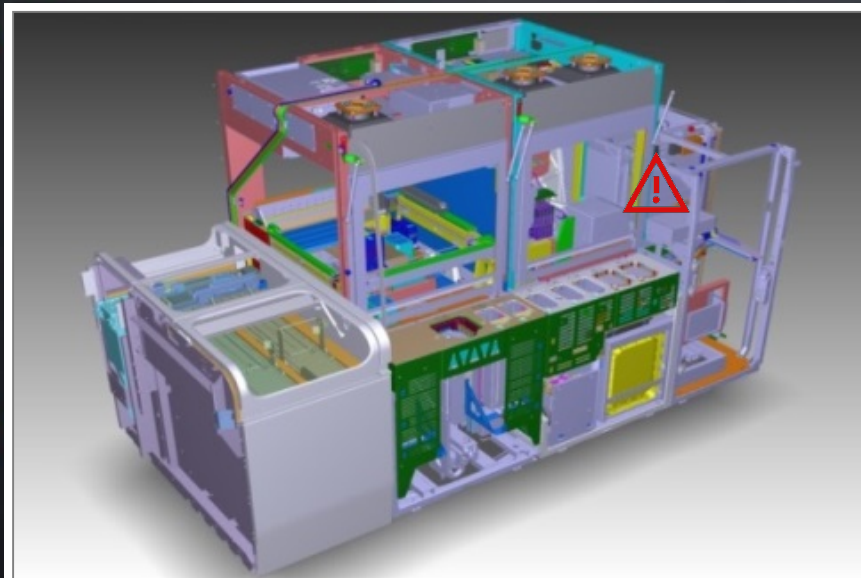
# Digital Transformation Program

## *Predictive Maintenance*



# Digital Transformation Program

## *Machine Learning in Predictive Maintenance*



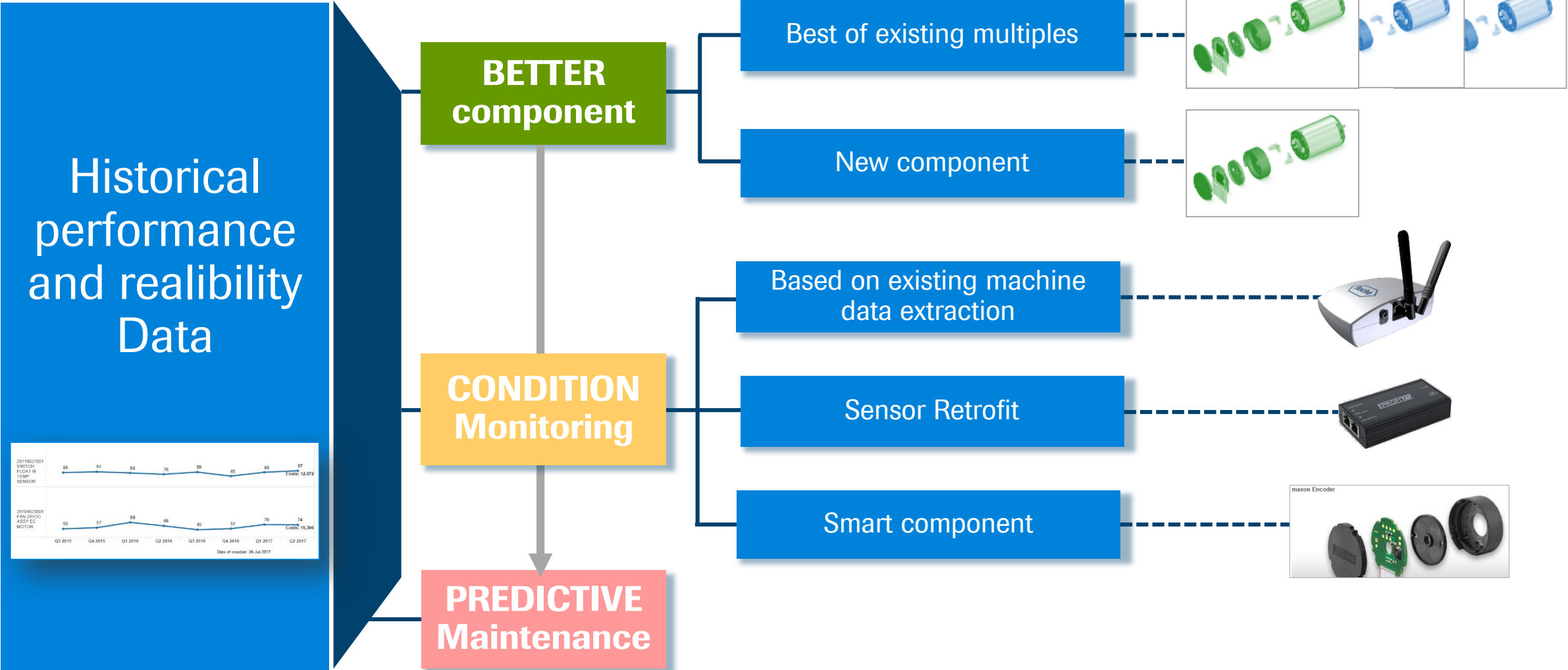
- Sensor Signals
- Service History
- Error Codes
- Environment Status
- ..

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

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

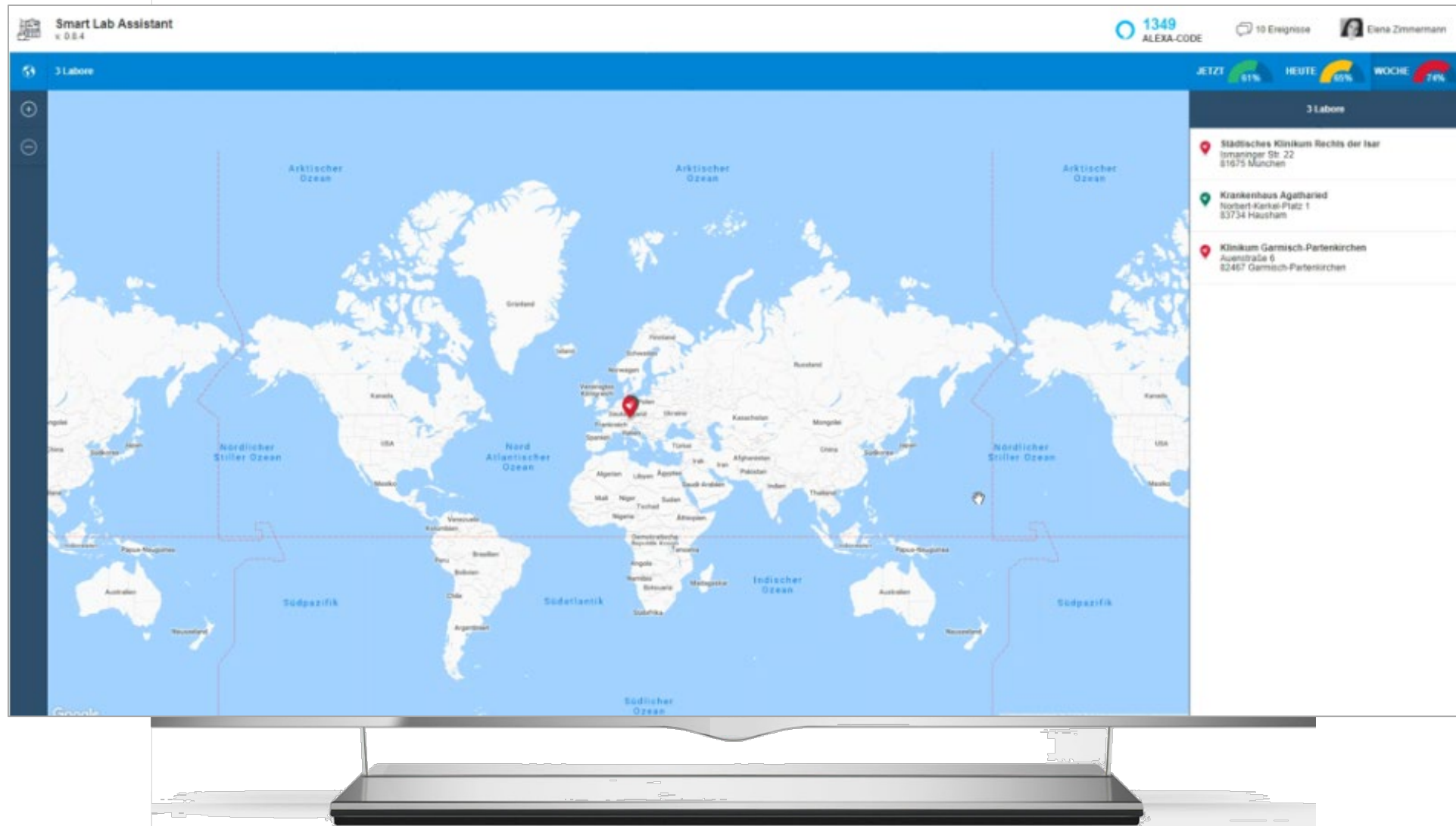
# Increase Uptime – Best Parts / Smart Parts

## *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**  
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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***