



# From Zero to One with Zero.One

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# Agenda

Introduction

Current Situation

Introduction to Zero.One

Predictive Maintenance in Theory and Practice

Machine Learning

Contact

An aerial photograph of an industrial facility, likely an offshore oil or gas platform. The image shows a complex network of blue metal structures, pipes, and walkways. Several workers in blue uniforms and white hard hats are visible on the platform. A large white cylindrical tank is prominent in the center. The background shows more of the facility and the surrounding sea.

## DECISION

*"I have repaired this item many times. Maybe it is better to buy a new one."*

## MATERIAL

*"Hi Joe, where is the needed material?"*

*The plant has been down for 5 days and I can't start with the repairing service."*

## PEOPLE

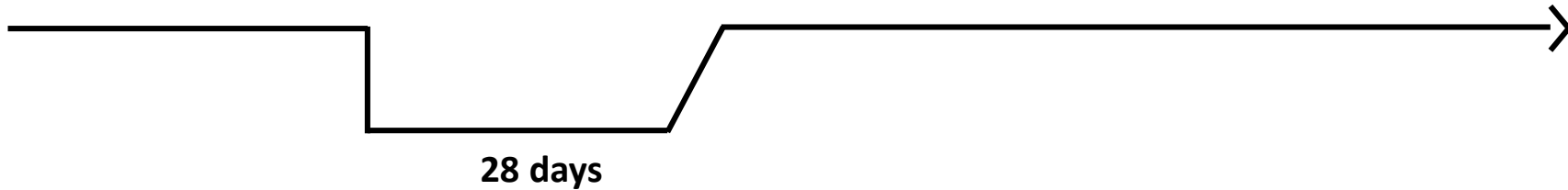
*"There were so many difficulties upfront to get our onsite service organized. Why can this not be faster?"*

## PROFIT

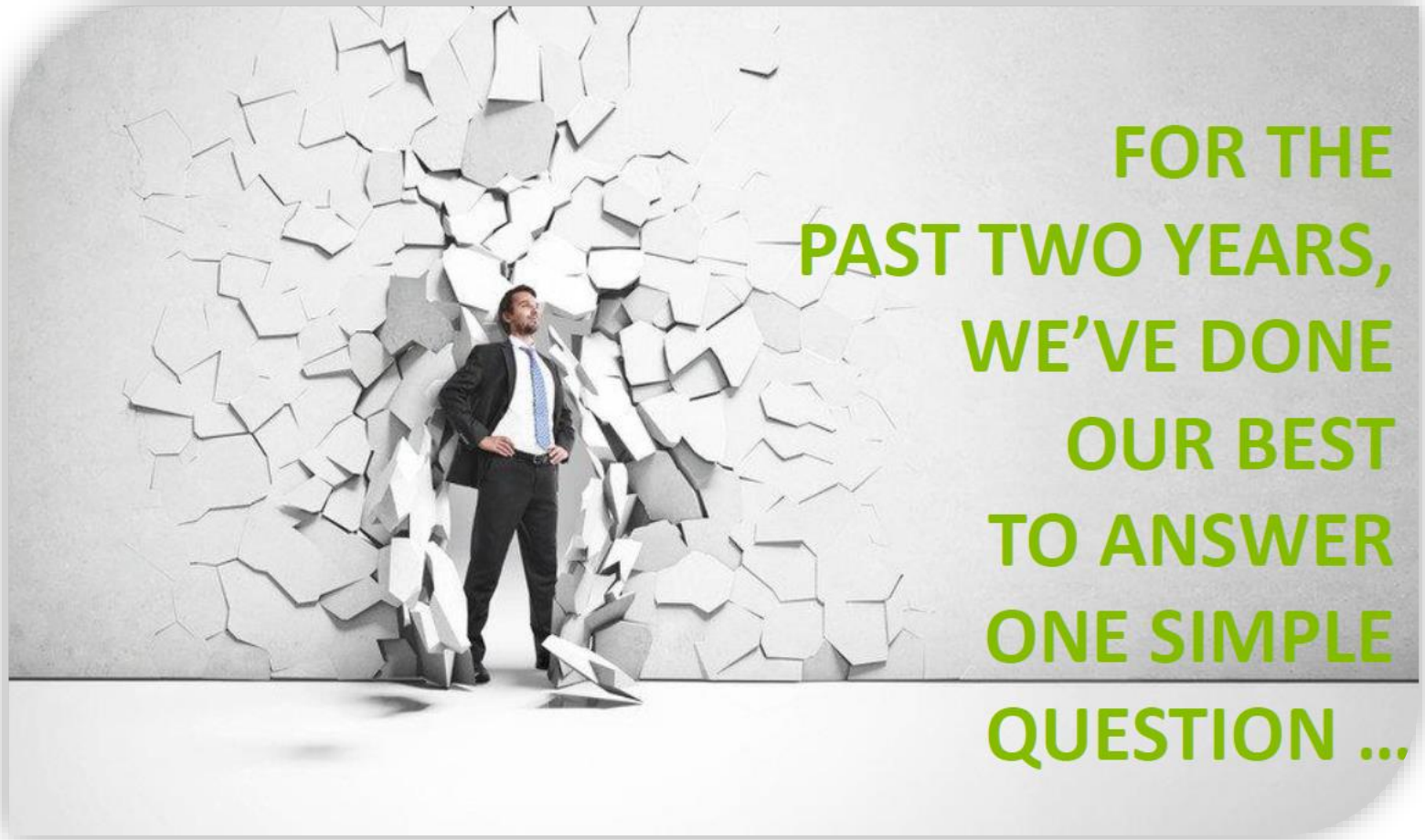
*"Hey boss, this downtime takes at least 14 days and will sum up to more than 4 million dollars."*

# Maintenance Schedule

Scheduled maintenance with longer downtime through inspection and material order







**FOR THE  
PAST TWO YEARS,  
WE'VE DONE  
OUR BEST  
TO ANSWER  
ONE SIMPLE  
QUESTION ...**



**“HOW CAN IOT TECHNOLOGY  
HELP THE PROCESS INDUSTRY  
TO IMPROVE  
THE ASSET PERFORMANCE?”**

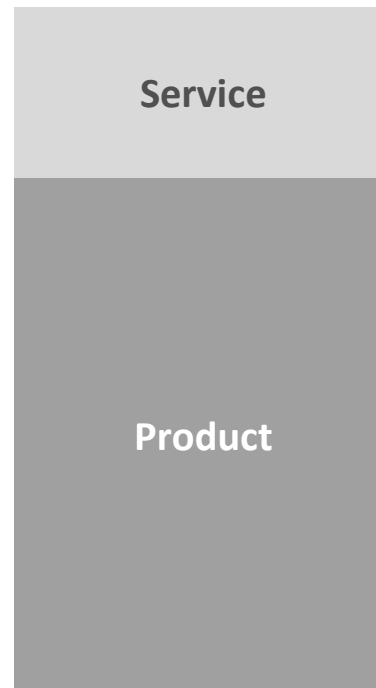
# Customer Benefits

Customer benefits based on function, availability and results

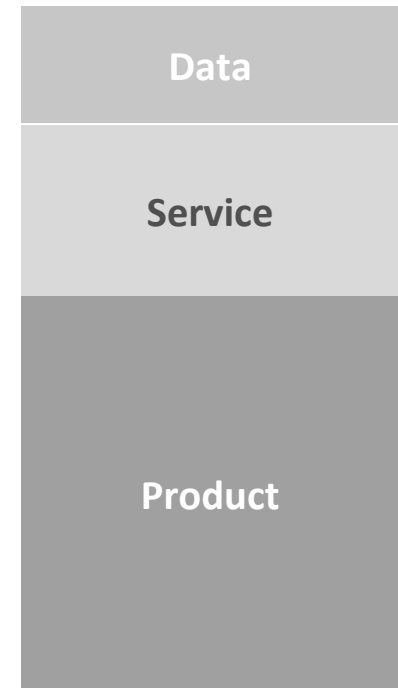
**1 Today**



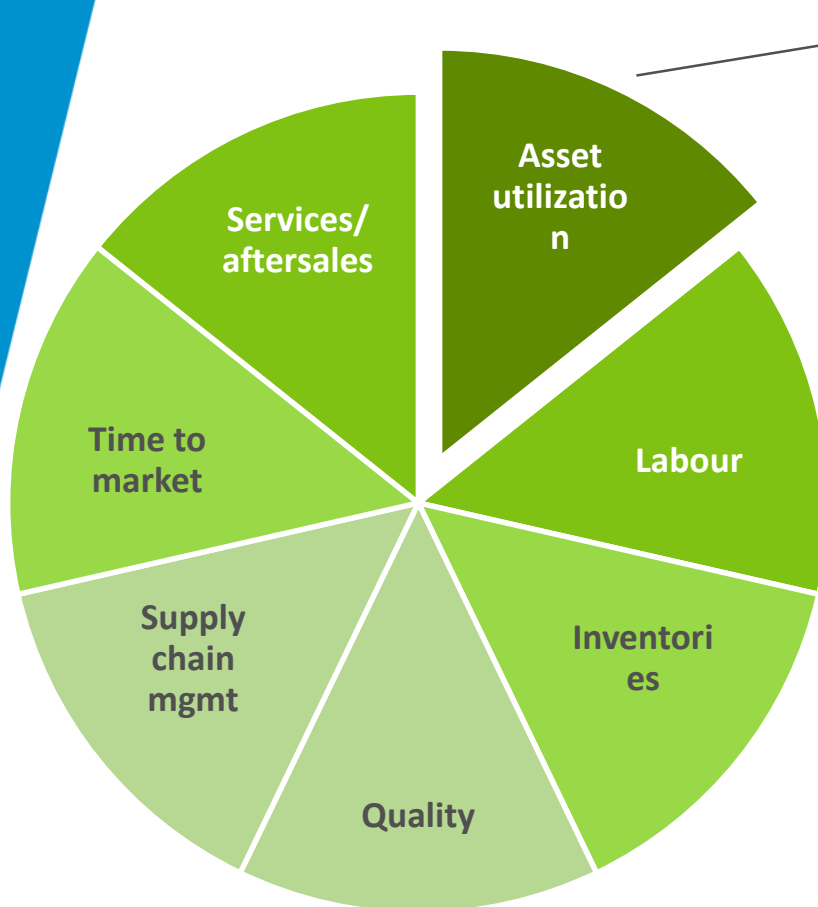
**2 Tomorrow**



**3 Near future**



# McKinsey Digital Compass - Value Drivers and Digital Levers



Remote Monitoring  
Predictive Maintenance  
Augmented Reality



- 
- A large, light gray arrow pointing downwards, indicating a flow or result from the digital levers to the outcomes listed below.
- Early indication of problems
  - Timely corrections
  - Prioritization of resources
  - 30 – 50% reduction of total plant downtime





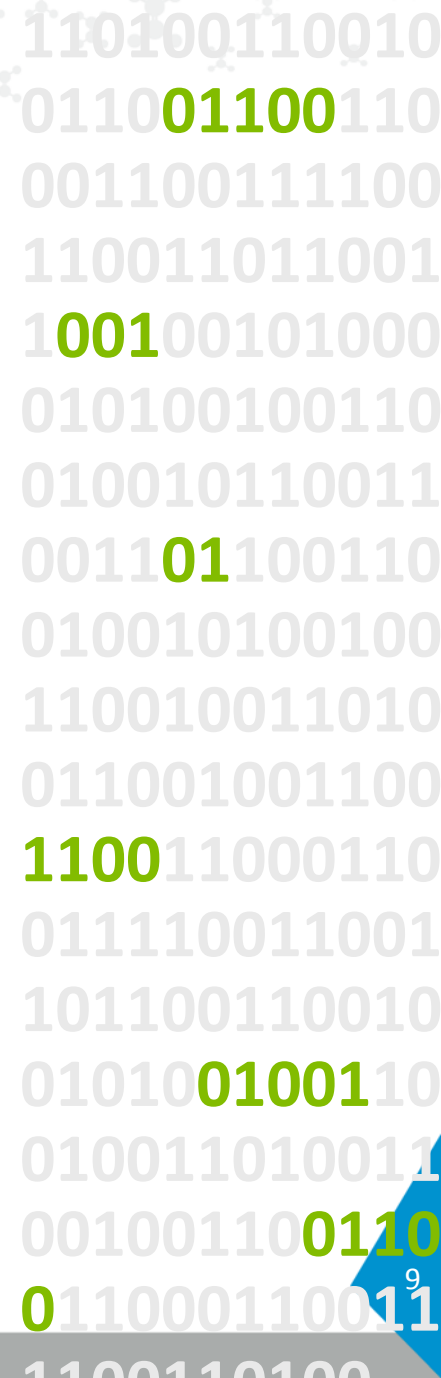
## THE DIGITAL SERVICE PLATFORM

**SCHMIDTSCHKE SCHACK connects existing plant equipment with the Internet of Things (IoT)**

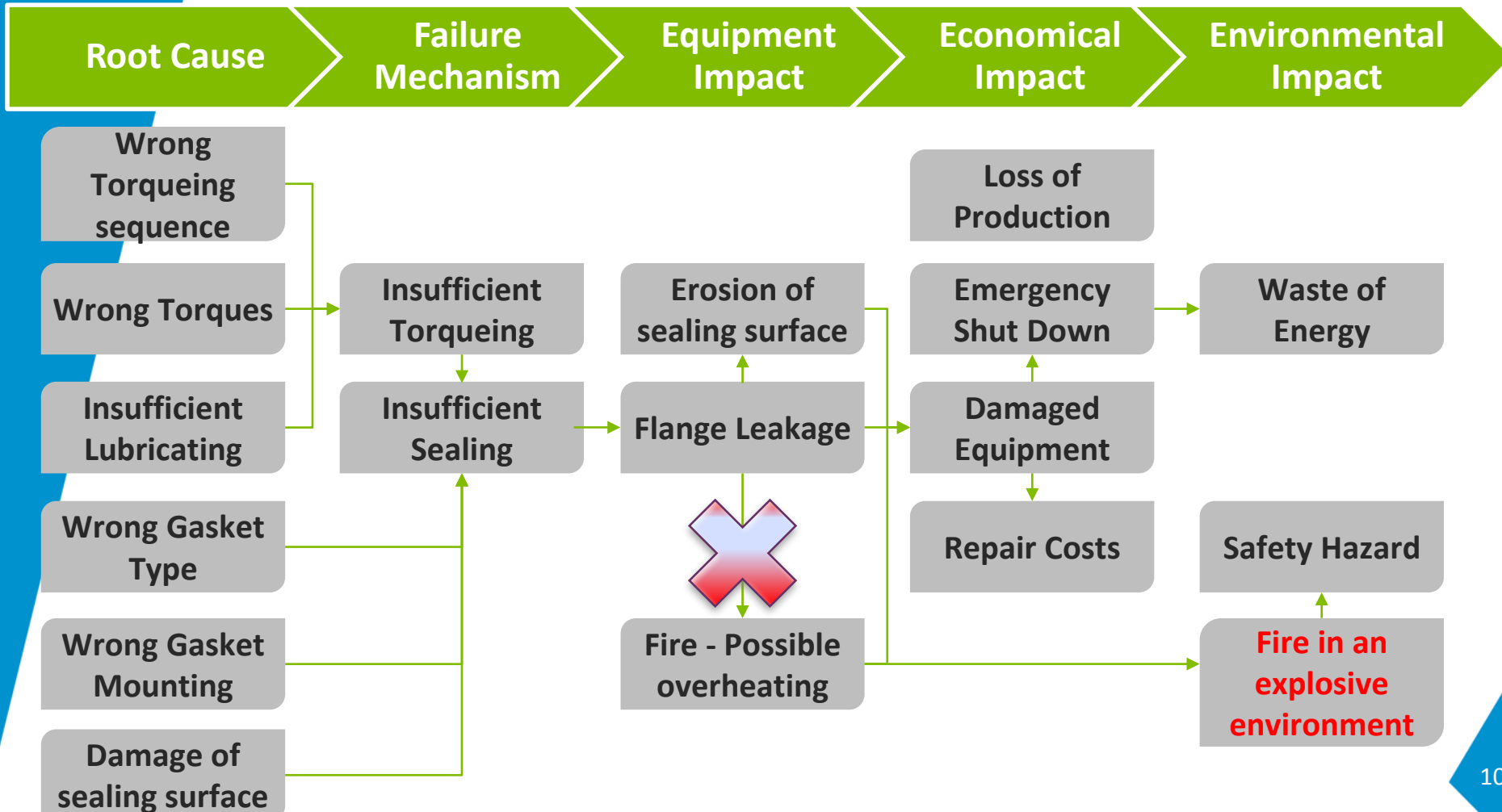
Sensor-based analysis of the components of an industrial plant

Minimized Downtime

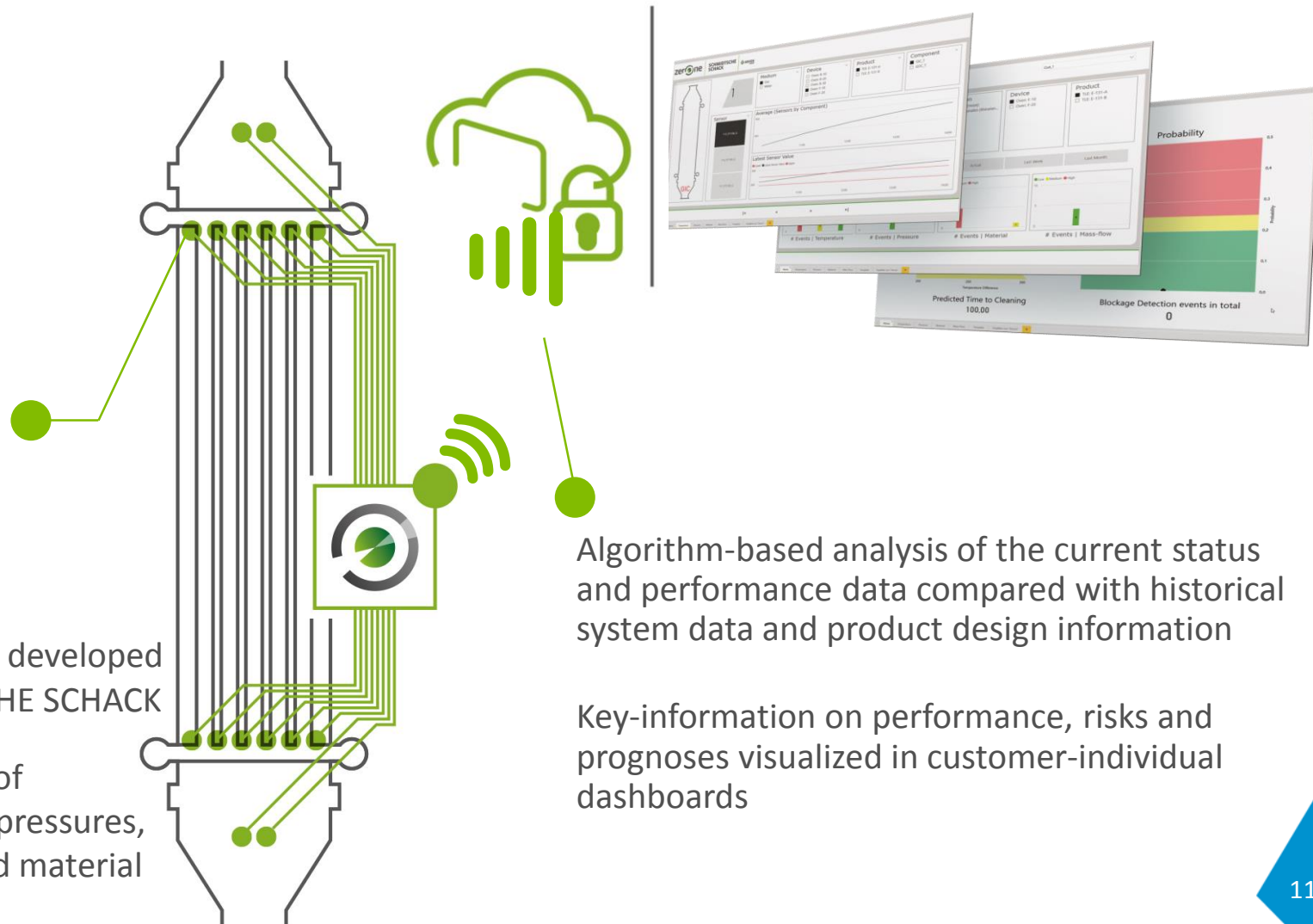
- Monitored threshold values
- Recommendations for optimal TLE utilization
- Easy-to-schedule service work



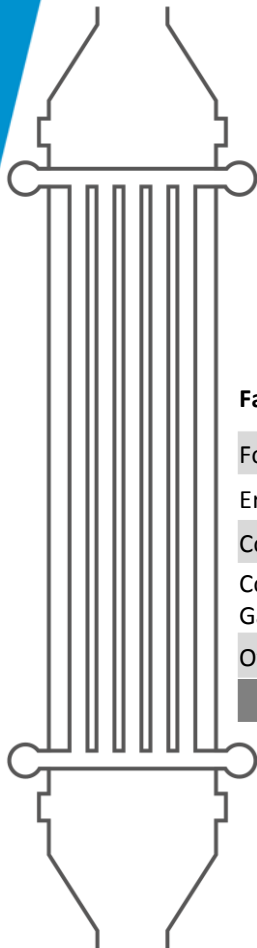
# Anatomy of Heat Exchanger Failure – Flange Leakage



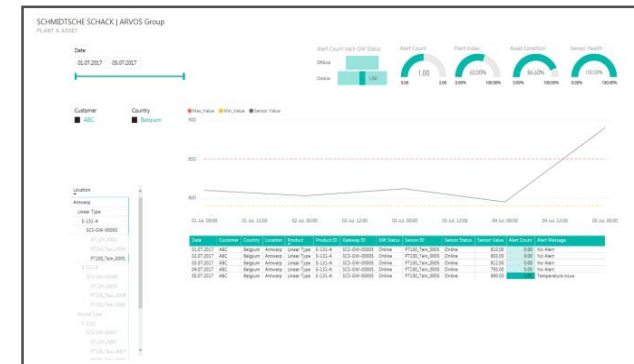
# How Does Zero.One Work?







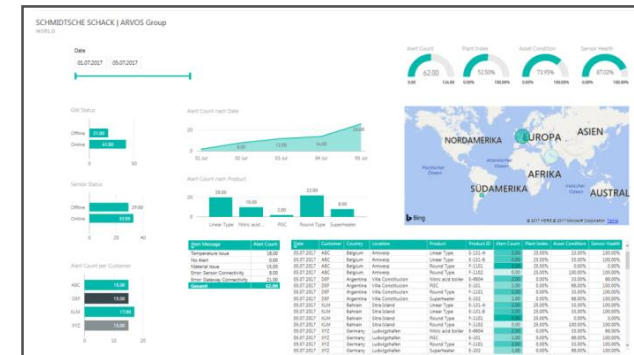
## Site condition



## Asset condition

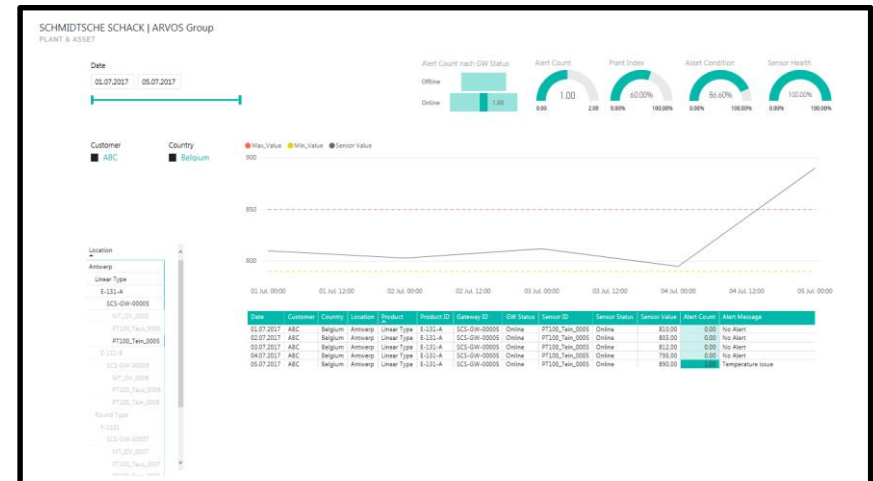
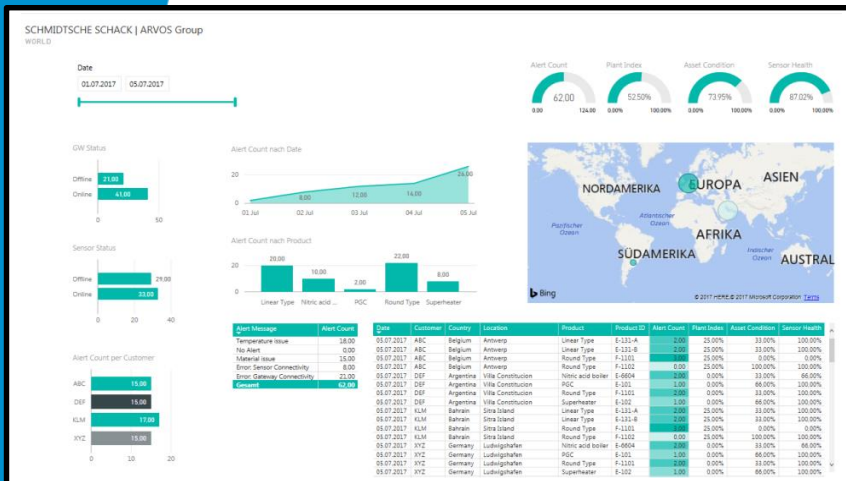
Failure Nature	Jan. 17	Apr. 17	Jul. 17	Okt. 17	Jan. 18	Apr. 18	Jul. 18	Okt. 18
Fouling/ Blockage								
Errosion/ Corrosion								
Connectivity Sensor								
Connectivity Gateway								
Others								
Total Risk								

## Fleet condition





# Dashboard Examples



World-wide status of **plant index**, **asset condition** and **sensor health**

**Alerts** presented by different categories

Per day, customer, product type **Sensor** and **gateway status**

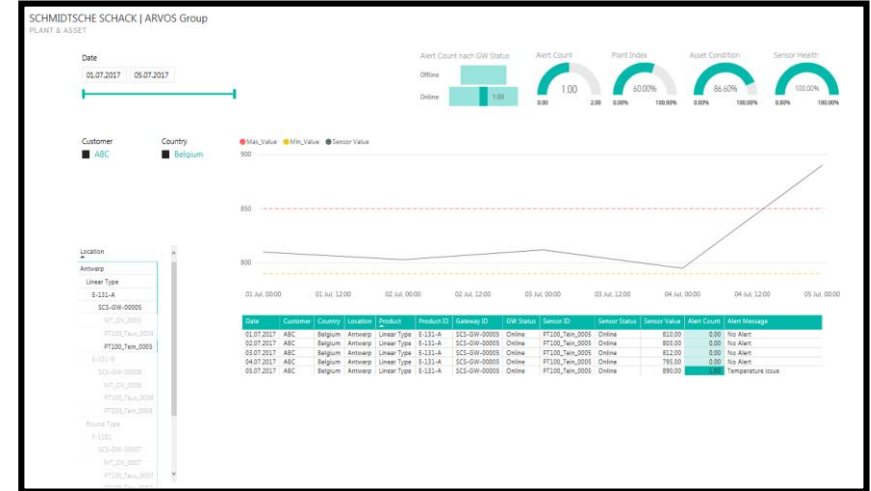
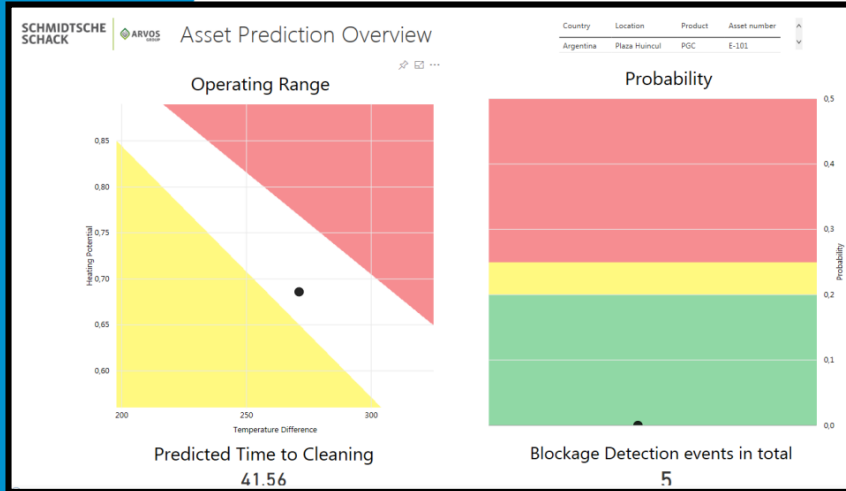
Sensor **values** above/ below thresholds

Drill down to a specific **customer**, **country**, **location**, **asset**, **gateway** and **sensor**

Alert count, plant index, asset condition and sensor health

**Time series analysis** per sensor incl. thresholds

# Dashboard Examples



## Asset Prediction Overview

Based on **historical data** and **ML algorithms**

Predicted time to cleaning

Probability of tube blockages within the TLE

Predictions on actual values vs. specified values to be developed

(e.g.: (actual – specified value) > +/- 10% = warning alert)

## Customer specific

Dashboard design and elements can be adapted per customer

Underlying ML algorithms to be developed per needed prediction

Presentation of live and historical data

MS Azure architecture to be designed per customer

# High Level Architecture

Customer site

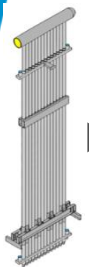
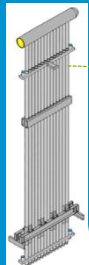


Cloud

SCHMIDTSCH  
SCHACK

ARVOS  
GROUP

Dashboards: life -, historical data, predictions New business models



Data Integration

Microsoft

Machine Learning

Storage

Live data

Historical data

Sensor/ gateway  
administration

Security  
components

Add. components  
if required

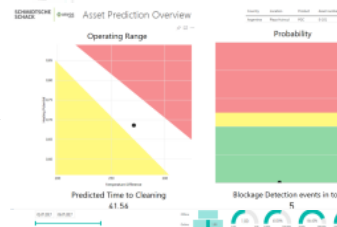
Transfer Line  
Exchangers

Syngas  
Coolers

Carbon Black  
Air Preheater

Process Gas  
Cooler

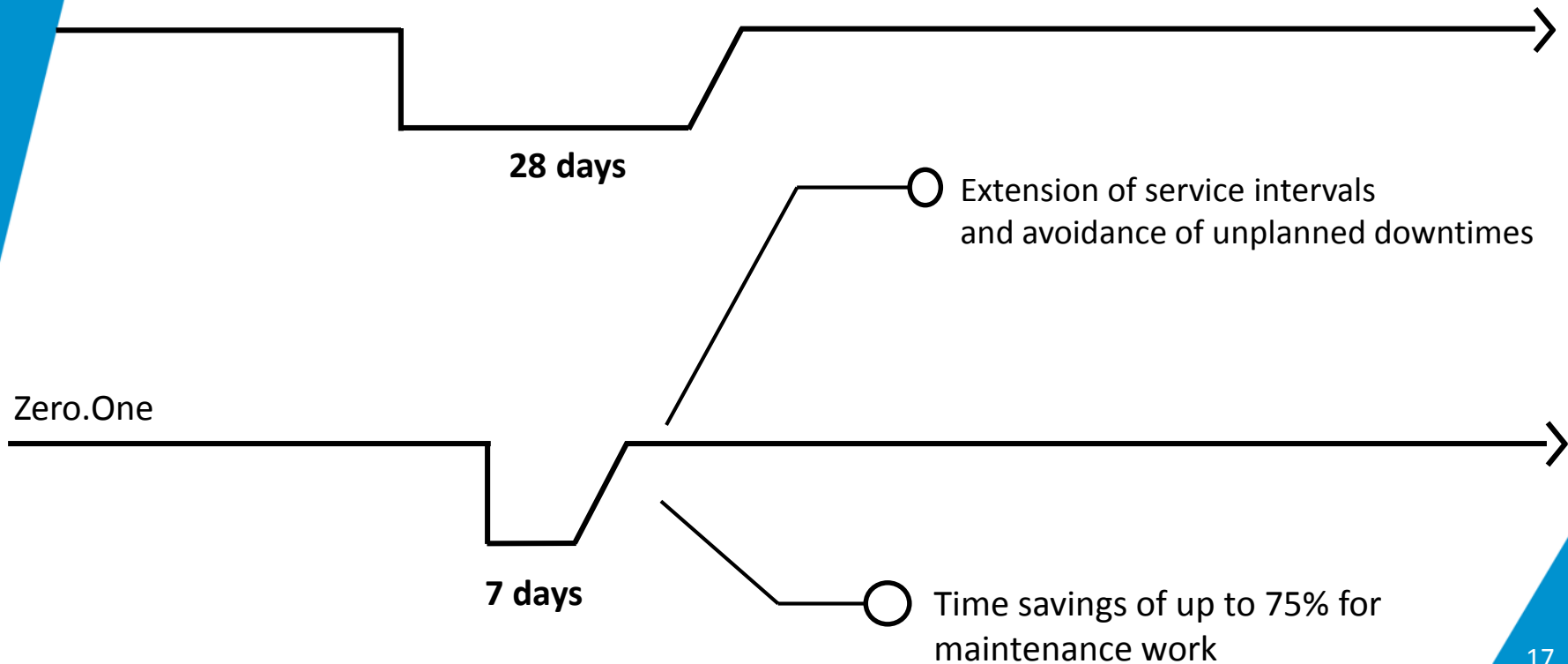
Nitric Acid  
Boiler



- Predictive Maintenance
- Service business development
- Smart data and dashboards for customers, service partners, etc.
- Consulting for IoT and data analytics

# Maintenance Schedule with Zero.One

Scheduled maintenance with longer downtime through inspection and material order



Life-cycle monitoring to  
detect material  
deterioration and wear  
at an early stage

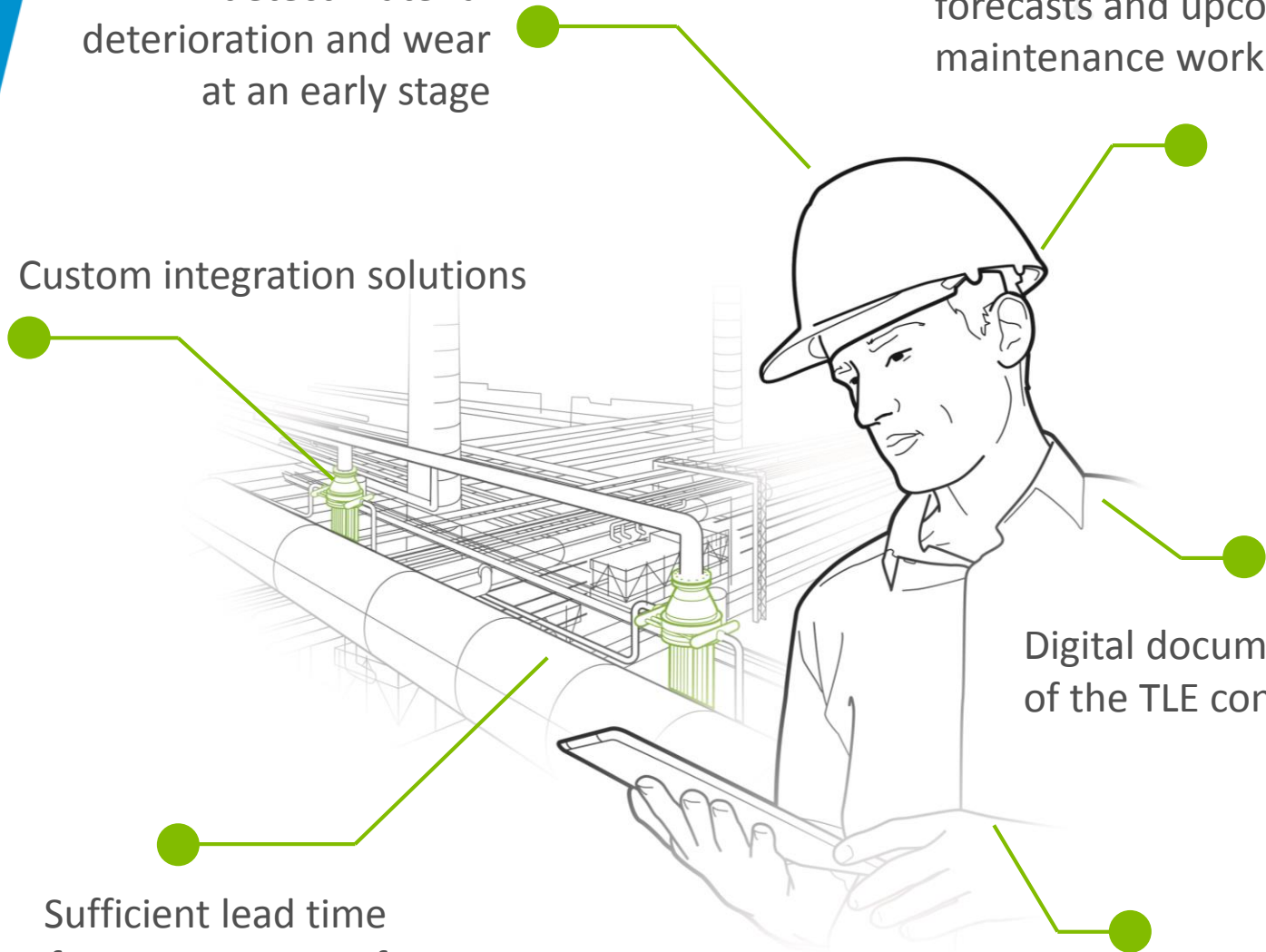
Preparation of availability  
forecasts and upcoming  
maintenance work

Custom integration solutions

Digital documentation  
of the TLE condition

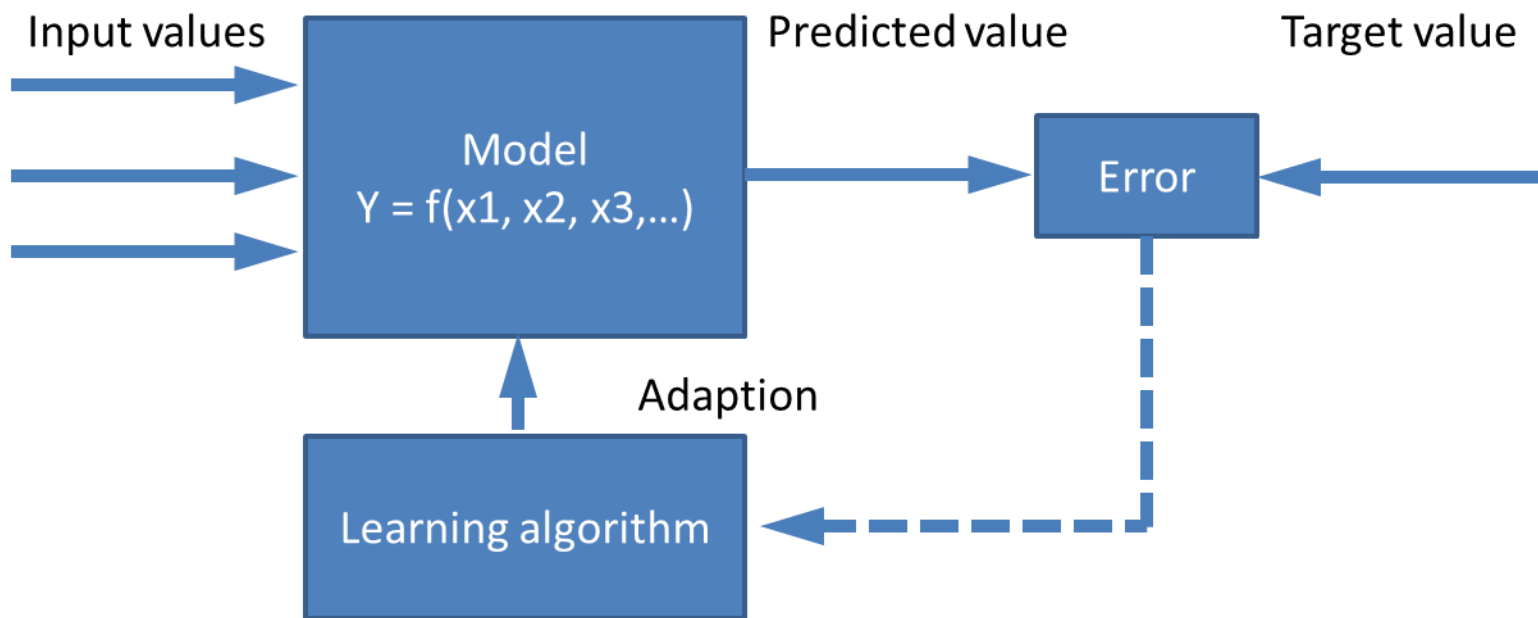
Sufficient lead time  
for procurement of  
replacement parts

Provision of comprehensible  
rationale for maintenance  
decisions



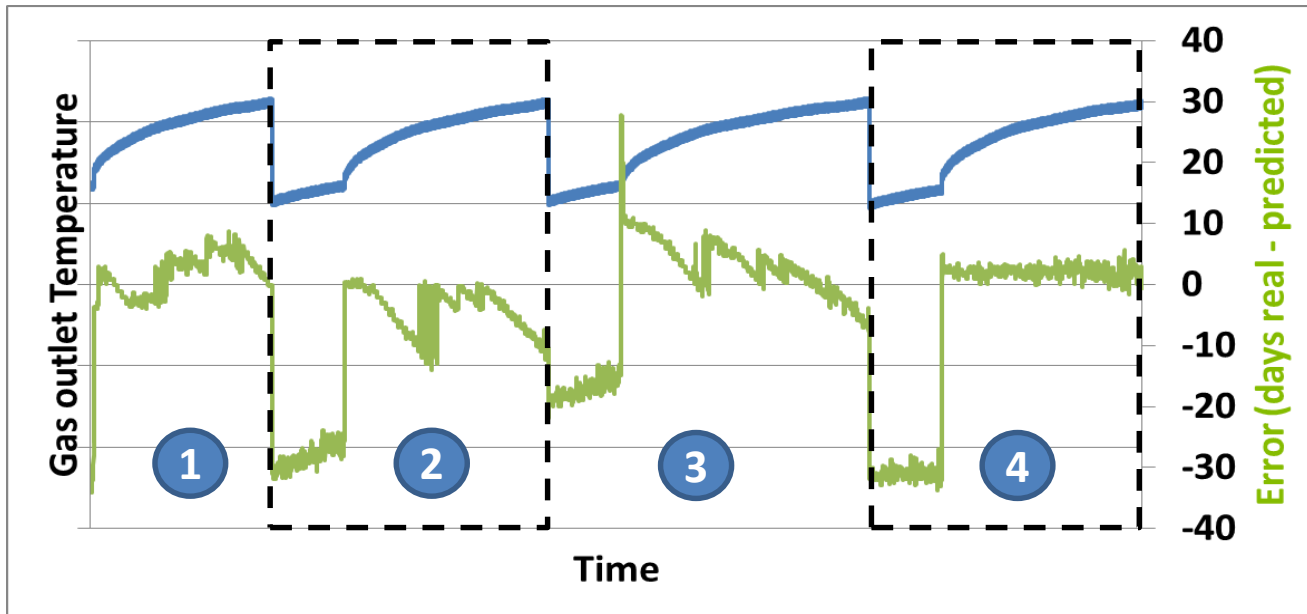


# Principle of machine learning



1. Training phase to adjust the model
2. Verification phase to evaluate model reaction to new input data

# Predict time until de-coke – Test the model



#	1	2	3	4
Heating Surface	85%	85%	100%	100%
Load	100%	90%	90%	100%
Operation time	reduced	regular	extended	regular

# Zero.One brings value to the whole team

- Predictable events
- Longer planning horizons with greater transparency
- Knowledge of what is going to happen
- Planning of service teams only on requirement
- Qualification of employees on digitalization





**SCHMIDTSCHACK**



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