Industrie 4.0 Leads Most Of Us To Think about…

Industry 4.0
Smart Factory

Robot
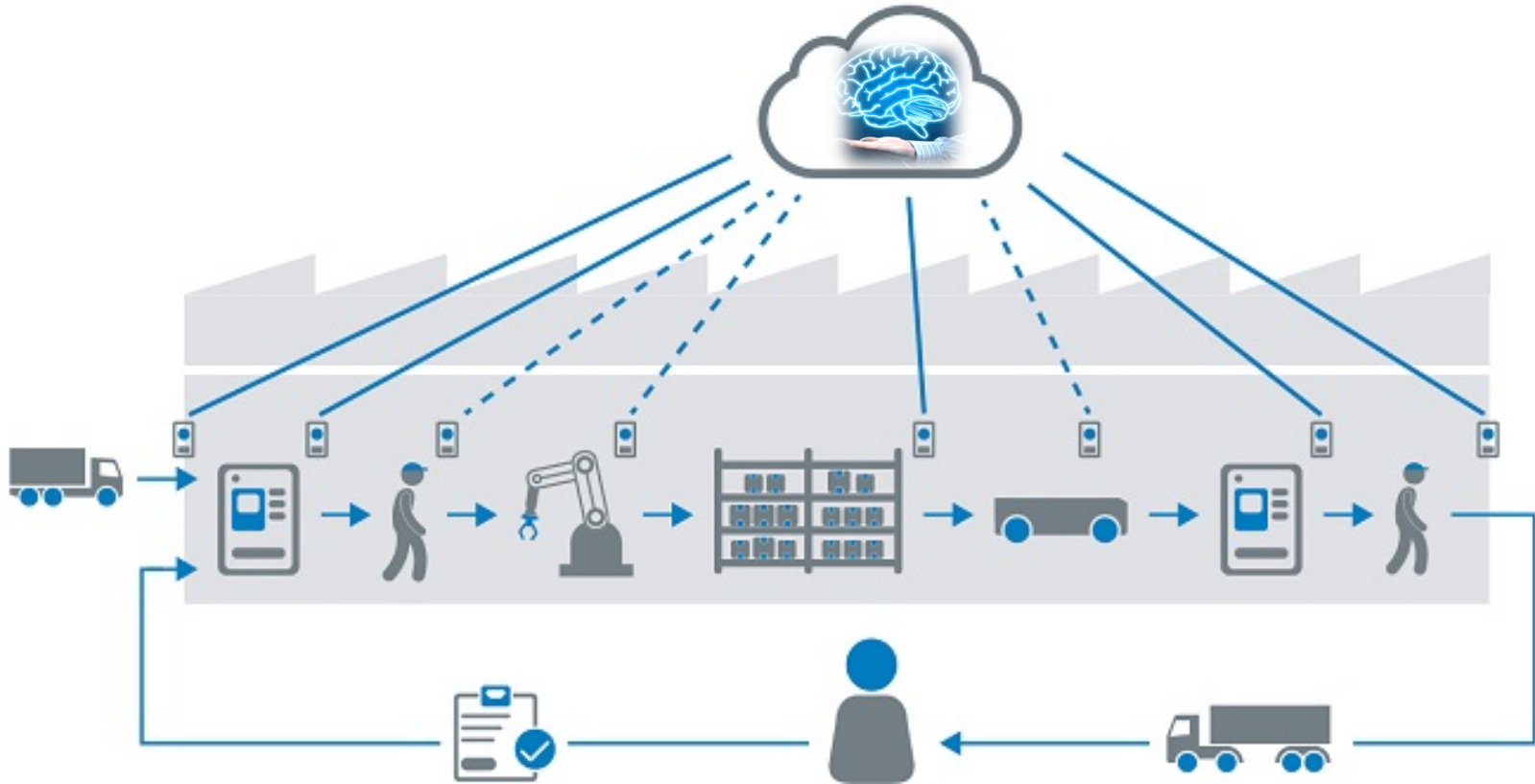
HMI

Control System

Sensor

Intelligent CNC

Monitoring Tool
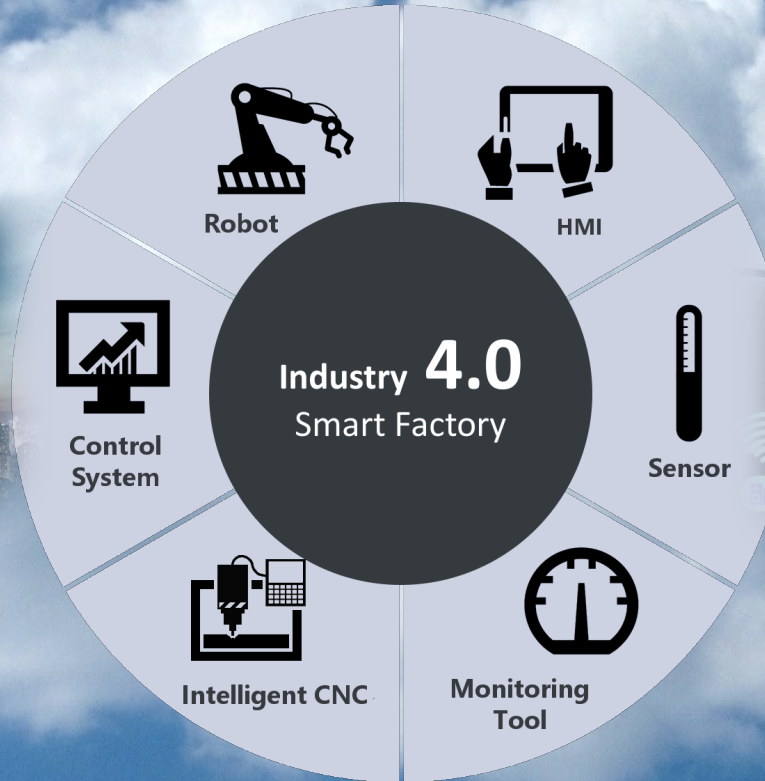
…Where Many Data Are Stored…

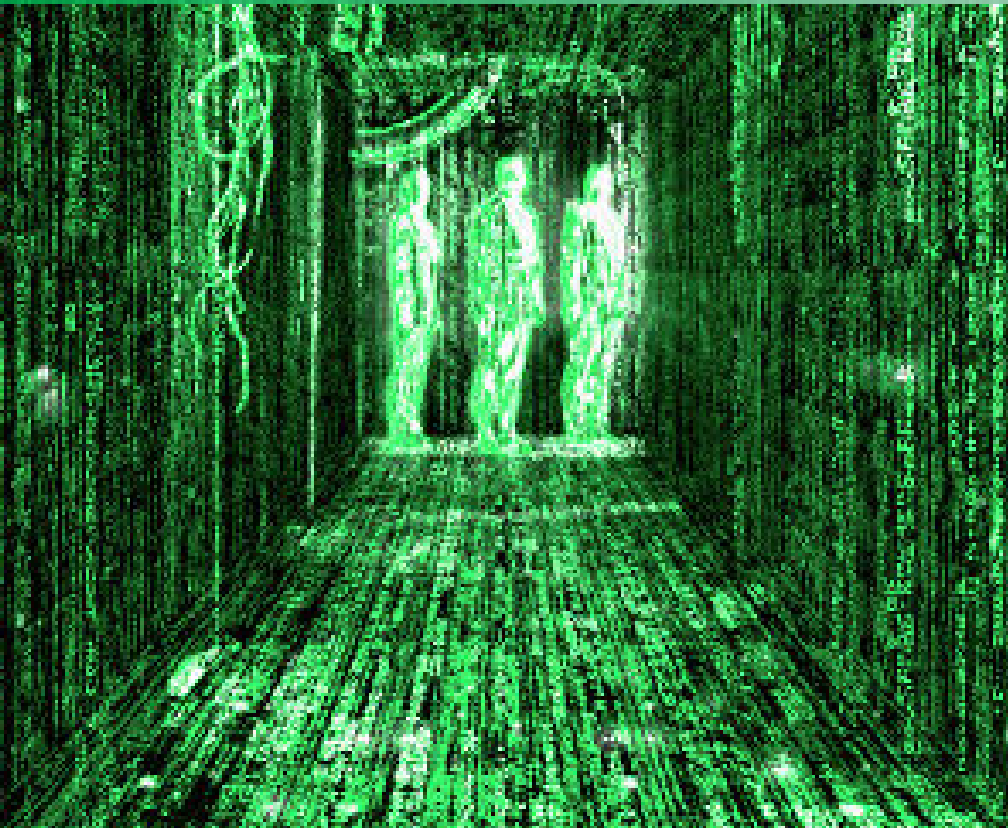…And All Factories, Homes,… Become Smart, Smarter And...

…But Mainly We Feel Like We Are In A Matrix And Need To Find The Door = Used Case!

So, What Did We Learn While Being In The „Digital Age" With „Industrie 4.0"?

Continuous Operation And Productivity Have Highest Ranking From Machine Builders And Operators

Operation Availability

P out / P in = Efficiency
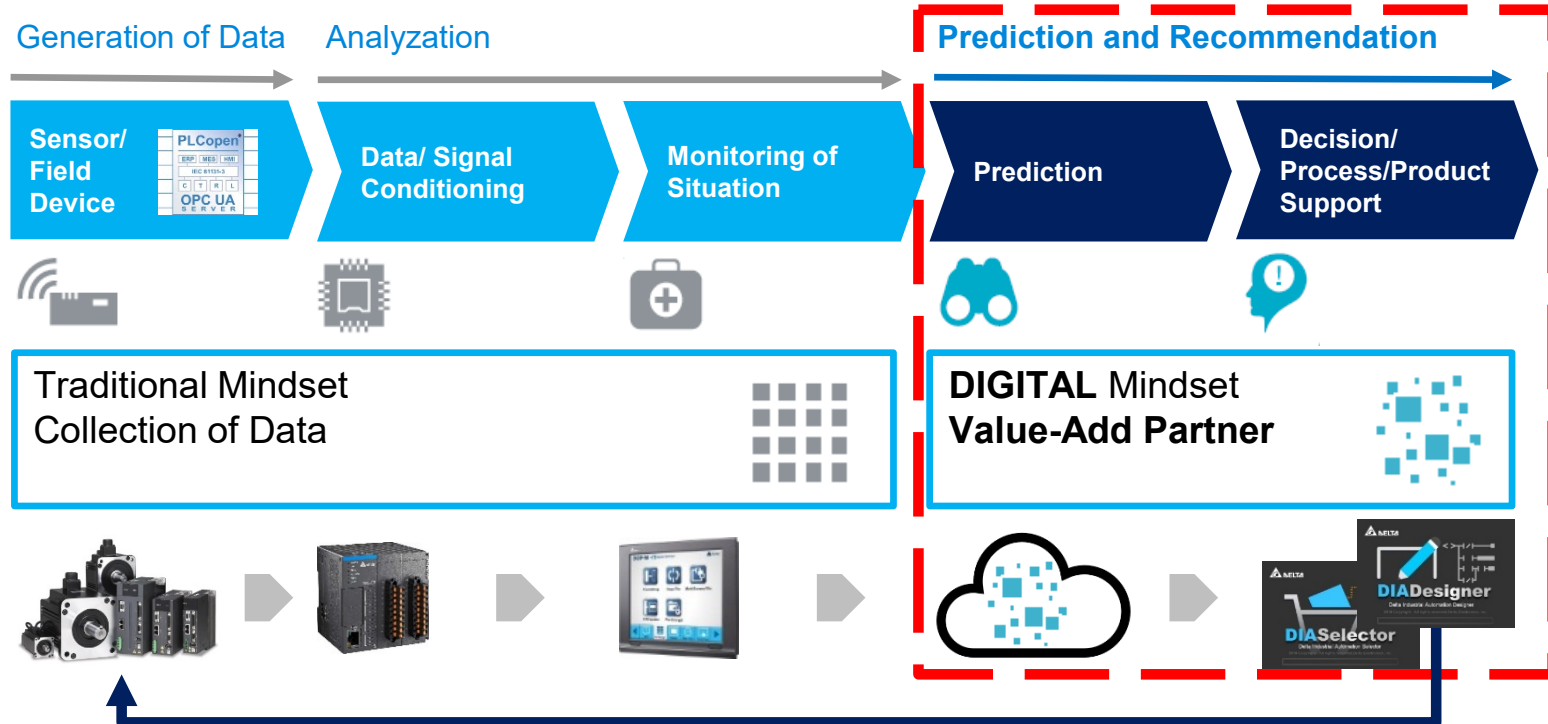
Reduce Wear	1.91
Optimum Fulfillment of CR	2.11
Improve Quality	2.17
Reduce Commissioning Time & Costs	2.21
Minimize Warranty Costs	2.43

Let's Have a Look At The <u>Digital</u> Value Chain

Obtained Data From The Field Needs To Generate Value For Engineering And Operation

Generation of Data   **Analyzation**   **Prediction and Recommendation**

| Sensor/ Field Device | Data/ Signal Conditioning | Monitoring of Situation | Prediction | Decision/ Process/Product Support |

Traditional Mindset
Collection of Data

DIGITAL Mindset
Value-Add Partner

Three Major Stakeholders Are Involved To Ensure Value Generation From Machine Data
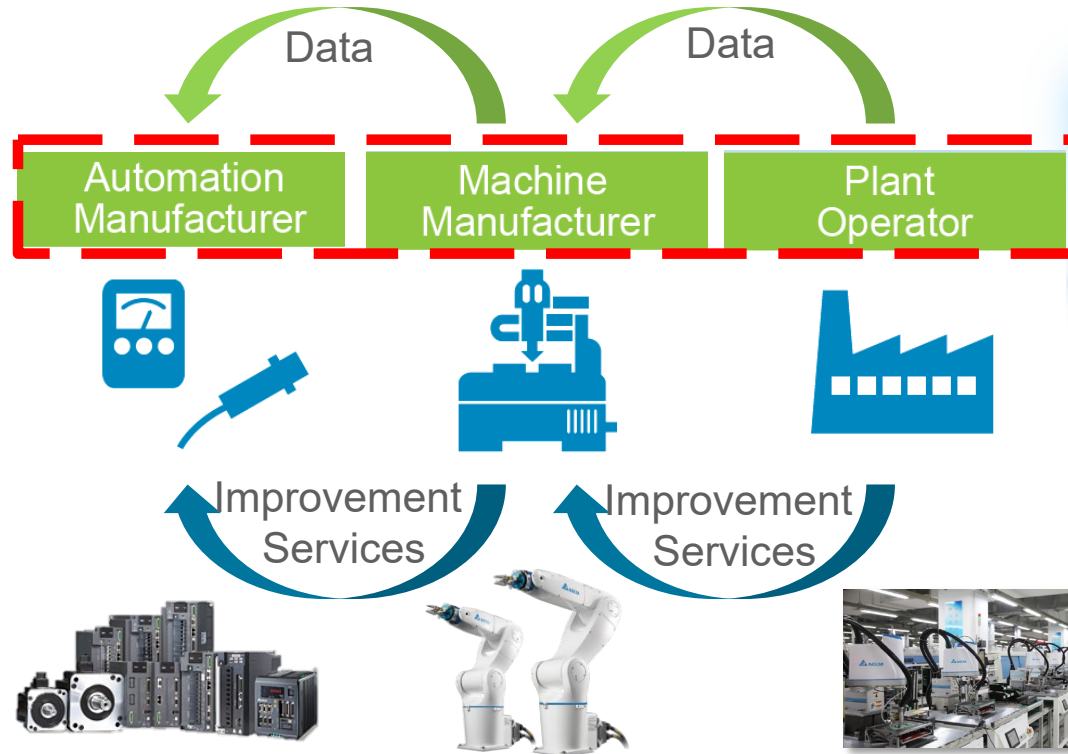
The Traditional Automation Pyramid Is Being Complemented By The Digital Service View

Innovations & Services

Enterprise Resource Planning

Factory Management / MES

Communication & Network

Control Level

Field Level

Cloud
Data & Information
Collect and Analyze

Data Recovery

Device Data

Machine Data

Process Data

ERP — Enterprise Level

MES — Operator's Level

PLC, PC, PID — Controller's Level

Sensors, Actuators — Field Level
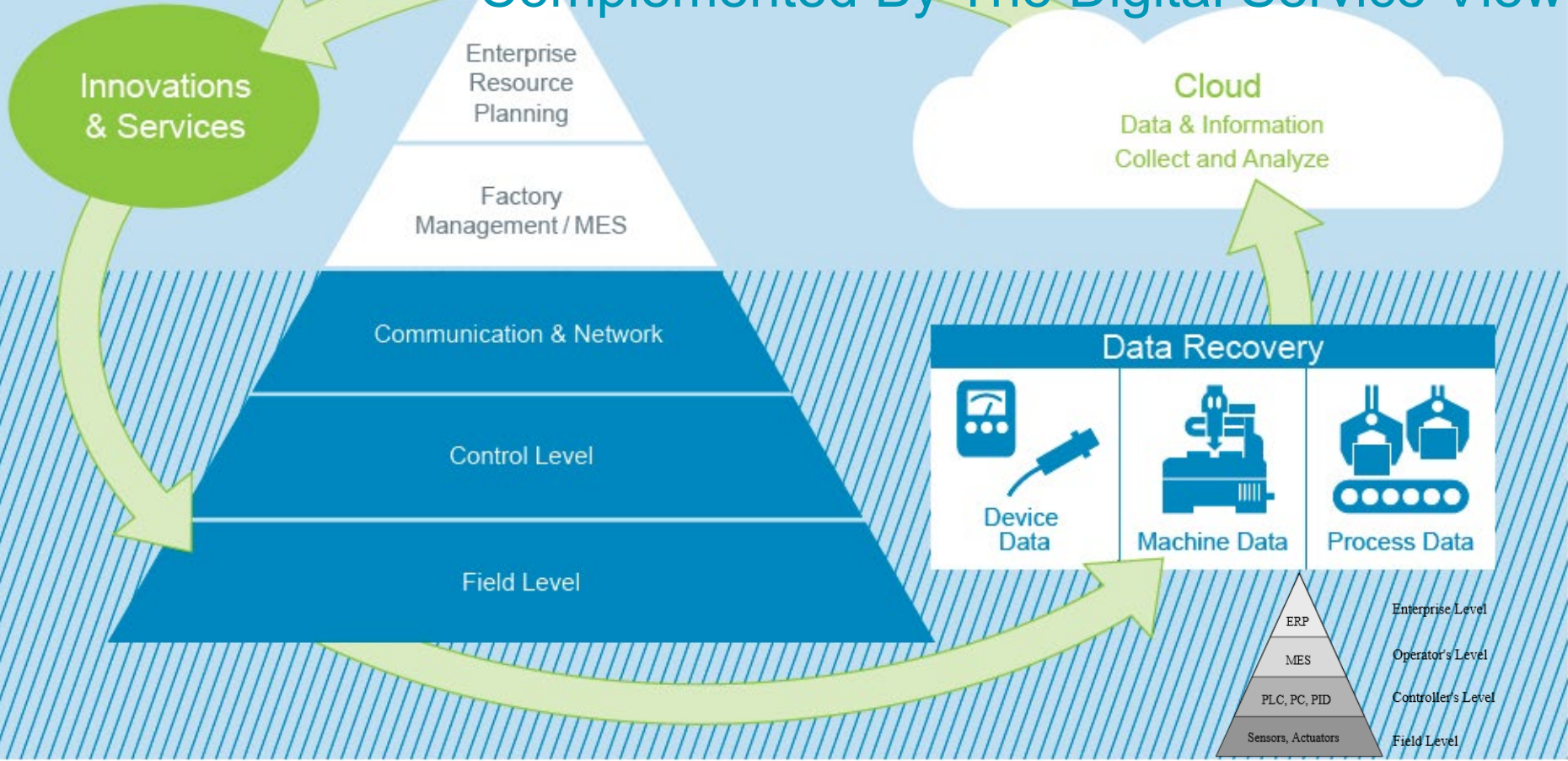
How Can We Turn It Into Practice?

Engineering Efforts Are Ranked As The Most Resource Consuming Tasks

Engineering	1.65
Drafting of Contracts	1.74
Marketing / Sales	1.88
Risk Mitigation Measures	2.12
Technology Maintenance, Updates	2.21
Machine Operating and Maintenance	2.39
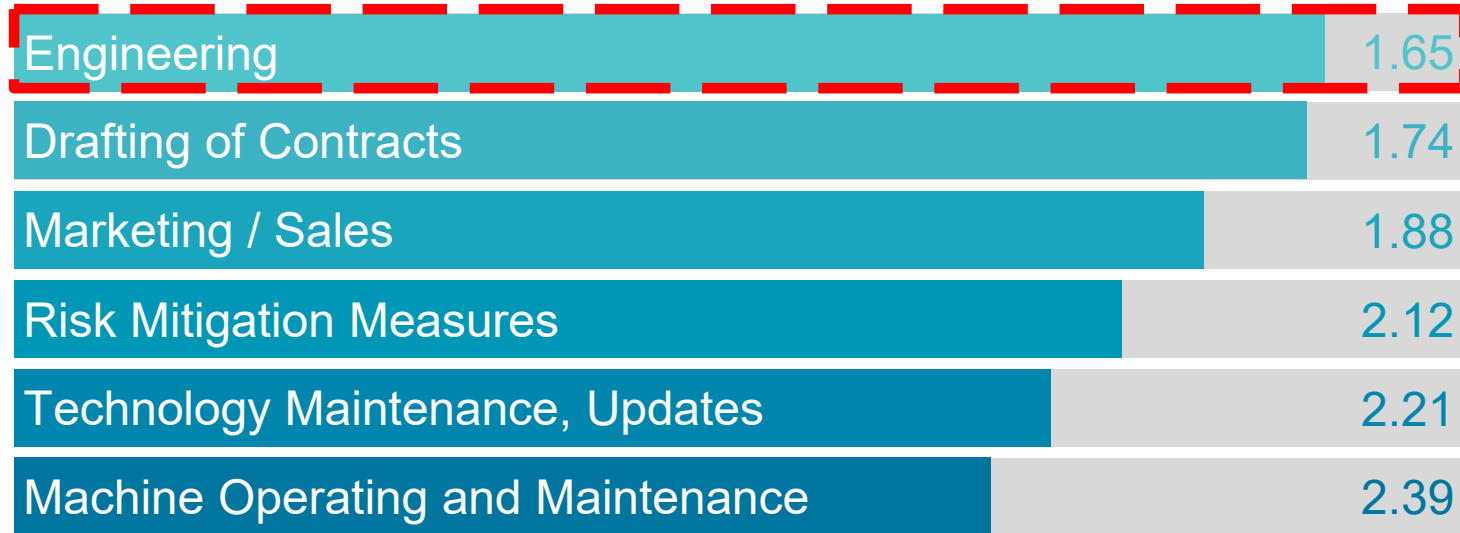
Figure 5: Average priority of efforts,
Source: VDMA Technik-im-Dialog "Value Generation from Machine Data" [1]

Portfolio Structured To Match The Value Chain

IIoT Structure

Data Analysis & Visualization
- IIoT Cloud-based Platform — DIACloud
- Big Data Analysis
- Artificial Intelligence (Edge / Cloud)
- Modeling & Simulation

DIAMMP Manufacturing Management Platform
DIAMES Manufacturing Execution System (MES)
DIASPC Statistical Process Control (SPC)
DIAPMS Preventative Maintenance System (PMS)
DIAWMS Warehouse Management System (WMS)
DIAAMS Alarm Management System (AMS)

Industrial PC
DIAView Supervisory Control & Data Acquisition System (SCADA)
DIALink Equipment IoT Platform
DIABCS Block Control System (BCS)
DIAMCS Material Control System (MCS)
DIACPC CIM PC System (CPC)
DIAEnergie Industrial Energy Management System (IEMS)

Networking
- IIoT Industrial Cloud Router
- Industrial Ethernet Solution
- Fieldbus Solution

Control & Sensing

Integration Software **DIAStudio**
- HMI
- PLC

Motion Control
- PLC-Based Motion Controller
- CAD / CAM Computer-Aided Design / Manufacturing
- CNC Controller
- PC-Based Motion Controller
- Motion Control Card

Robot Controller

Machine Vision System

Sensor
- Pressure Sensor
- Smart Sensor
- Encoder

Meter & Measurement
- Power Meter
- Temp. Controller
- Gas Flow Meter

System & Equipment
- AC Motor Drive
- Servo System — AC Servo Drive & Motor
- Planetary Gearbox
- Linear Stage
- Industrial Power Supply
- Servo Press
- Robot
- Robot Workstations
  - Pick & Place
  - Inspection
  - Screw Driving
  - Soldering

Application Scenarios Are Concrete Examples From Everyday Business – Useful For Joint Projects

Scenario Targeted Product Development

Increase reliability

Scenario Service Promise

Better hedging of warranty commitments

Scenario Performance Benchmarking

Targeted measures to increase efficiency

Scenario Digital Twin

Shorten development time by comparing model and reality

Interest Of Parties Is Different But If it Becomes Complementary It Becomes Beneficial For All

Application Scenario: Condition Monitoring

Assessment and evaluation of the benefit aspects for …	Project Partner 1 e.g. Machine Manufacturer	Project Partner 2 e.g. Plant Operator
Minimize Downtime		
Optimize Availability		
Improve Productivity		
Increase Efficiency		
Reduce Wear		
Optimum Fulfilment of Customer Requirements		
Improve Quality		
Reduce Commissioning Time and Costs		
Minimize Warranty Costs		

How About The Risk Of Loosing My Data Property?

Rating of the Data

Is there a risk for the plant operator due to the transfer of the data?

— yes → **Data only available to the plant operator**

↓ no

Is the data protection law violated by the disclosure of this data?

— yes →

↓ no

Do other contracts prevent the disclosure of this data?

— yes → **Data available to the pla... and the machine m...**

↓ no

May this data be passed on to third parties by machine manufacturers?

— no →

— yes → **Data ava... the machi... (e. g. au...**

Only If The Three Major Stakeholders Are Working Close Together Can Value Be Generated

Data

Data

Automation Manufacturer

Machine Manufacturer

Plant Operator

Improvement Services

Improvement Services
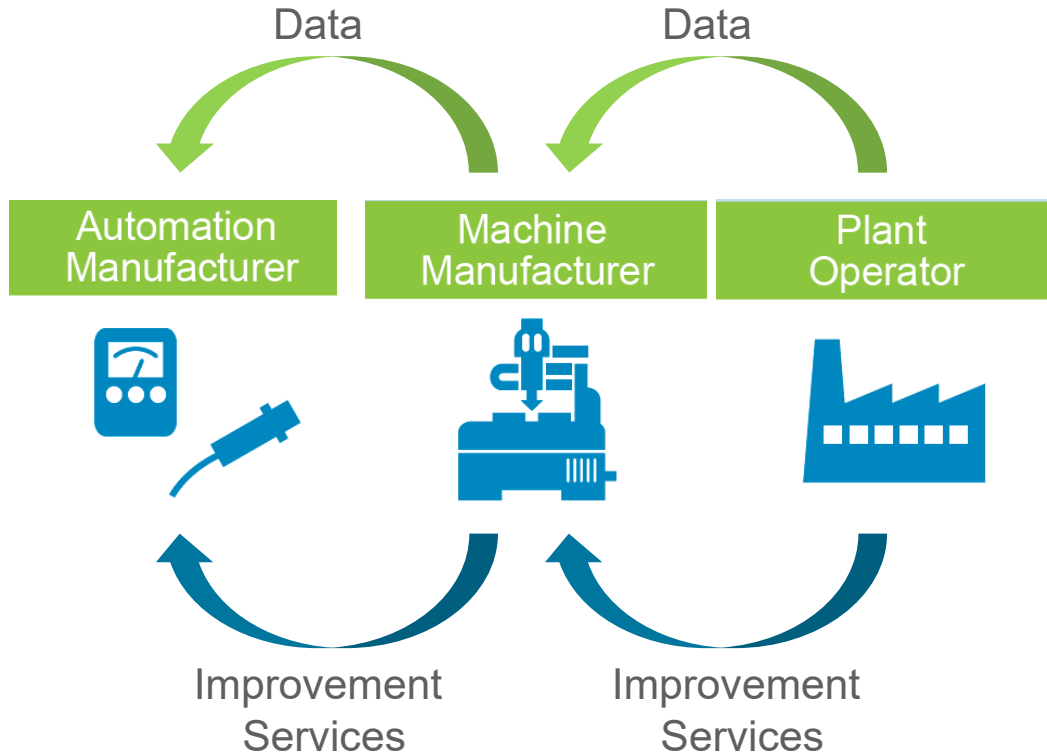
- ✓ Automation companies are partners in information retrieval

- ✓ Mutual trust and a common application scenario are the basis for success

- ✓ For future competitiveness data exchange is essential

- ✓ Creating win-win for all parties involved

- ✓ Assessment of Benefit, Effort and Risk

- ✓ Partnership is the starting point of value generation

Together, we achieve more!

Smarter. Greener. Together.

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