

ctrlX AUTOMATION

apertura y libertad en la automatización

Hans Michael Krause
Bosch Rexroth



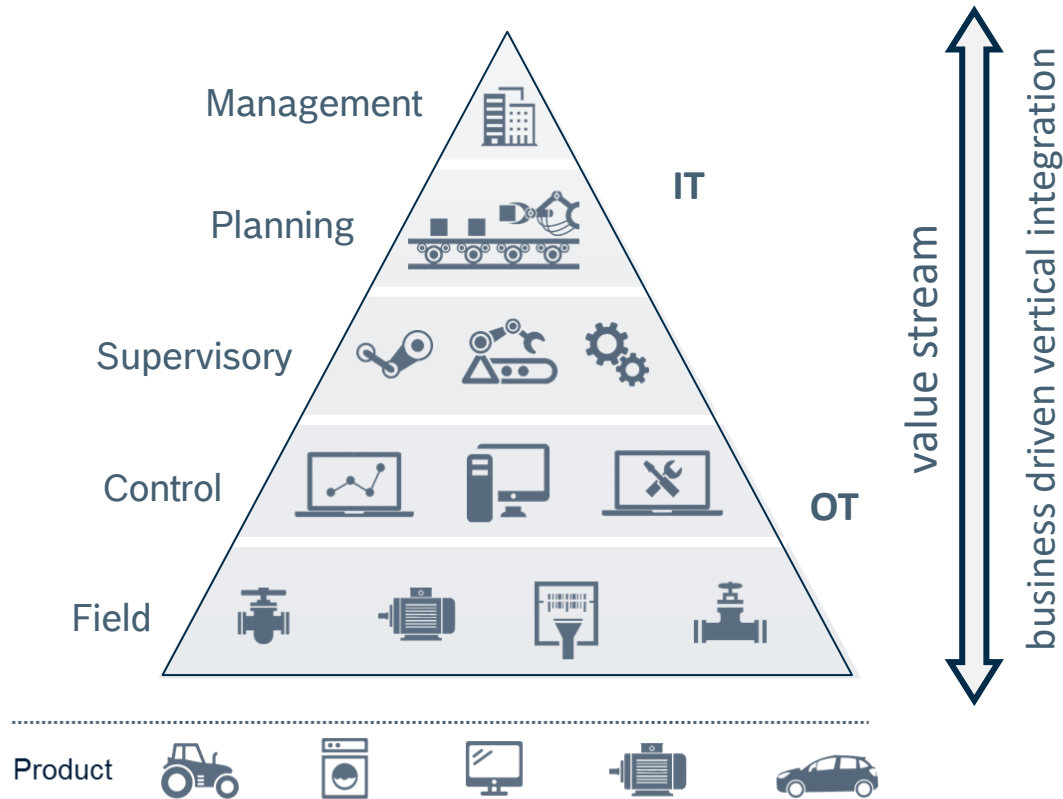
Transformación hacia la Factoría del futuro

Situación actual



Transformación hacia la Factoría del futuro

Automatizar la transformación

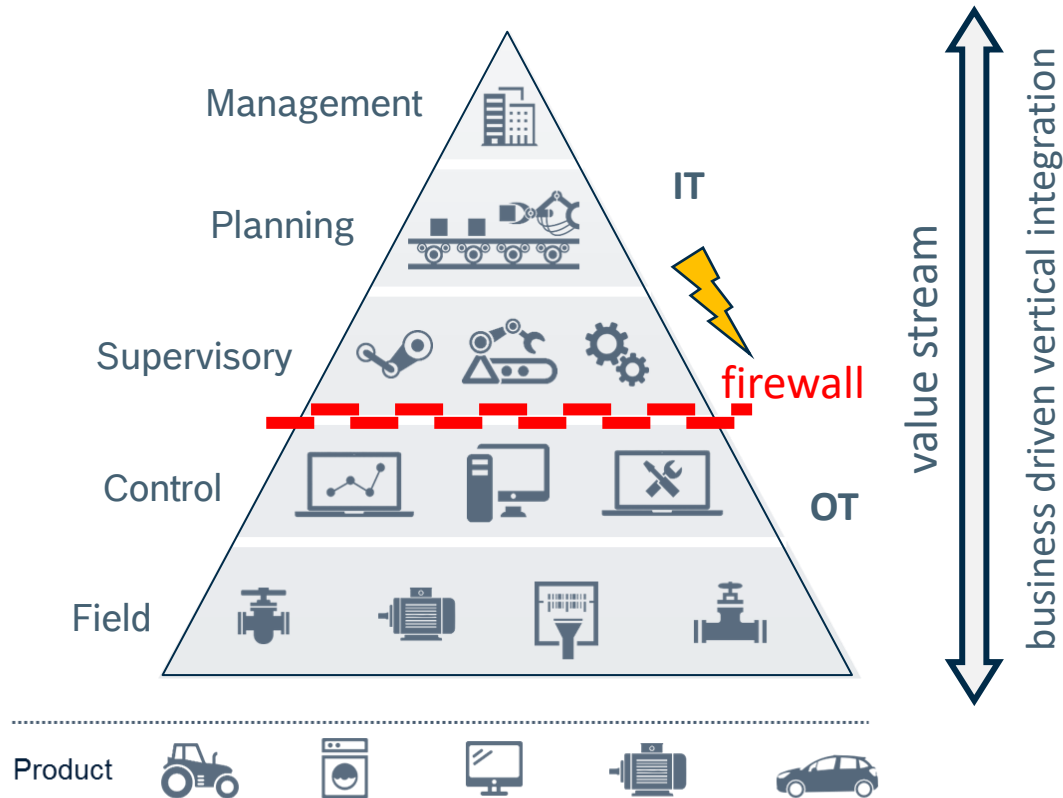


El valor para el cliente en el mundo VUCA

- Planificación flexible de producción end to end
- Distribución de carga dinámica entre plantas productivas
- Modificaciones de producto consistentes y optimizaciones entre departamentos y plantas de producción
- Reconfiguración rápida de equipamientos
- Gestión de calidad mejorada
- OEE optimizado

Transformación hacia la Factoría del futuro

Impedimentos para Automatizar el cambio



Impedimentos

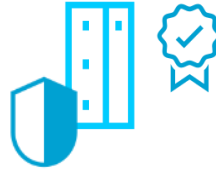
- Ecosistemas e interfaces "propietarios"
- Dispositivos OT sin seguridad de datos
- Aislamiento de la comunicación entre campo y control mediante firewalls
- No existe determinismo ni capacidades de análisis en tiempo real en IT
- Paquetes de solución monolíticos poco flexibles
- No existe entorno para colaboración entre dominios.

Transformación hacia la Factoría del futuro

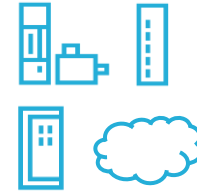
Requerimientos para una nueva plataforma de automatización



Conectividad



Seguridad



Independencia de Hardware



Administrabilidad



Determinista



Abierto y con posibilidad de expansión

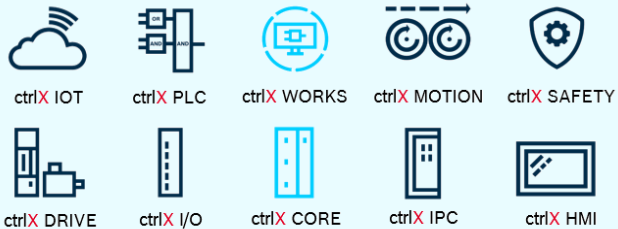
**THE SMARTPHONE
OF AUTOMATION.**



ctrlX AUTOMATION

The smartphone in the automation industry

Complete automation platform



Linux OS & app-based microservice architecture



LINUX

+



APPS

Free choice of programming language & toolchain



Engineering minus 30%

- ▶ Web-based
- ▶ No/low code
- ▶ All languages & tools
- ▶ Digital twin
- ▶ Engineering automation
- ▶ Collaboration

Cloud-based device admin

via ctrlX Device Portal

- ▶ Remote access
- ▶ Software roll-out
- ▶ Updates
- ▶ Backup
- ▶ Restore



IoT integration with security by design



Future proof



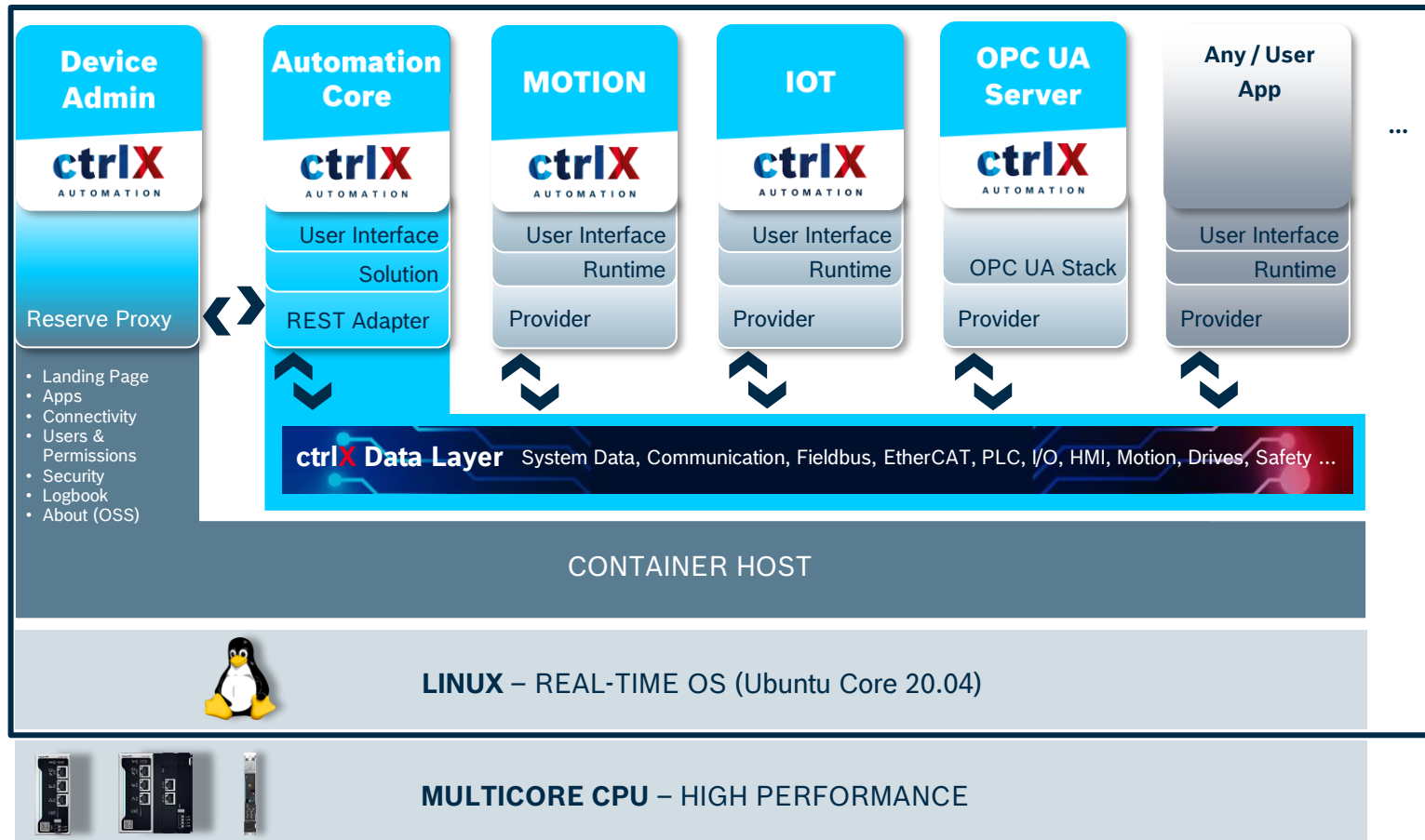
ctrlX AUTOMATION

La plataforma con posibilidades ilimitadas



ctrlX AUTOMATION

ctrlX CORE – a lot of features on board for the smartphone feeling



ctrlX CORE RUNTIME



Ubuntu Core

- Real-time Linux Kernel
- Install, configure, refresh and remove apps



Automation Core

- App access on ctrlX Data Layer
- Realtime behavior – task scheduling
- System diagnosis



Solutions

Manage app configurations



Device Admin

- Network user management
- Access control
- Web based engineering



ctrlX AUTOMATION

ctrlX Store

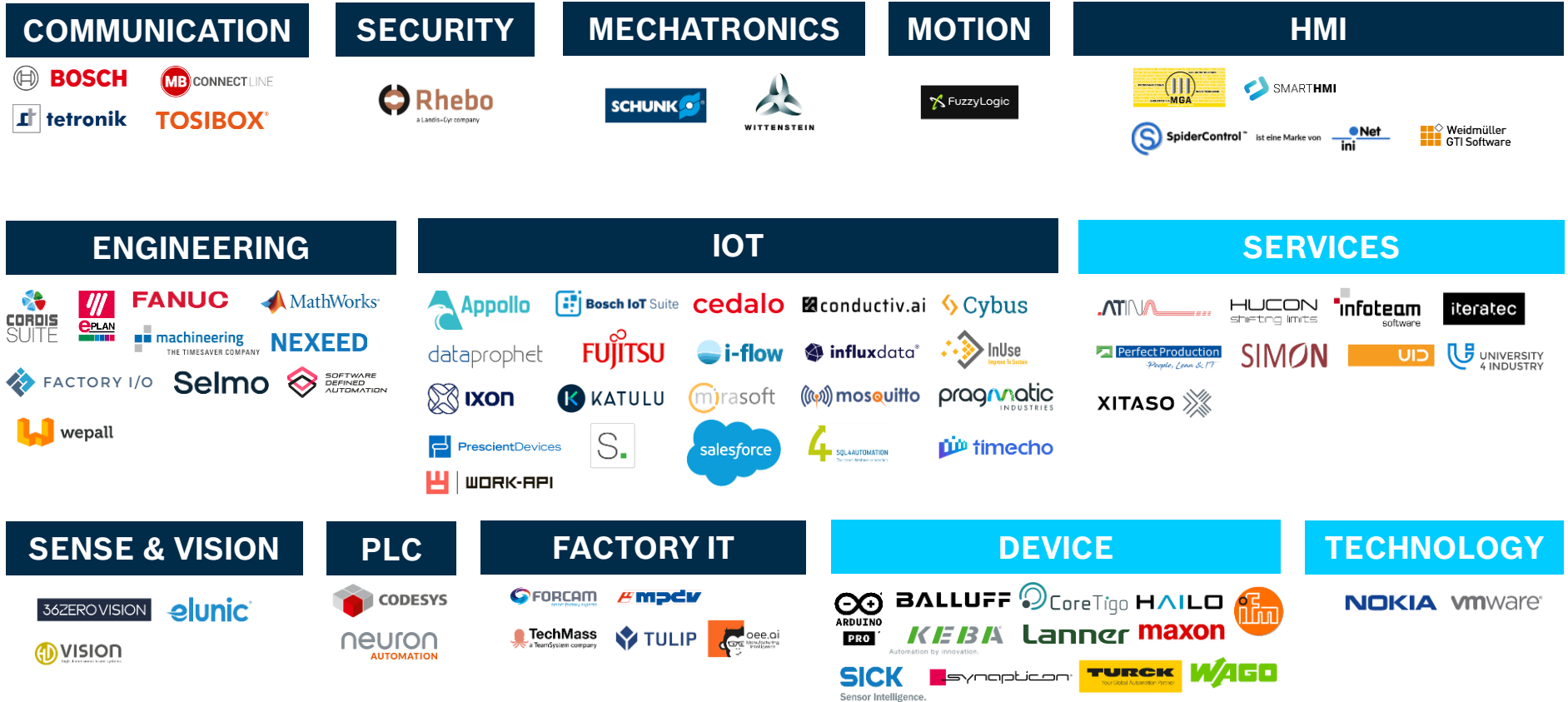


1 Control –
endless configurations

50 Apps available
in the ctrlX Store

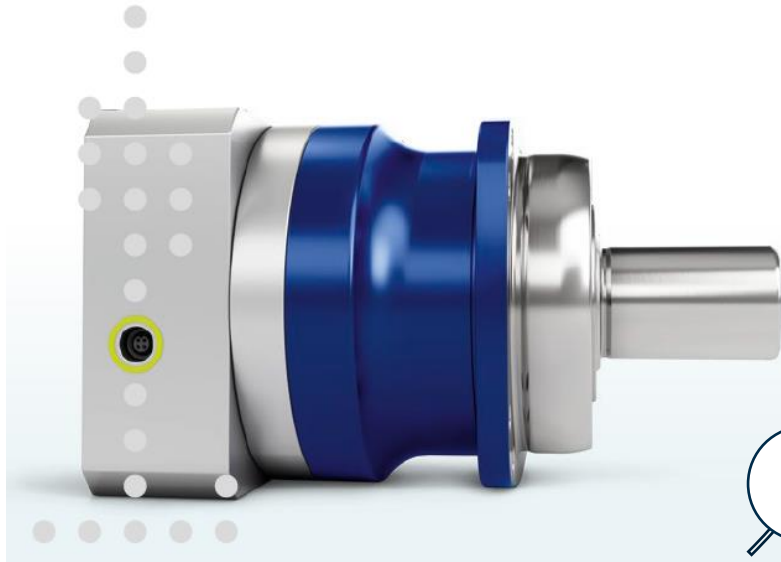
ctrlX World

73 partners in the open ecosystem



ctrlX World

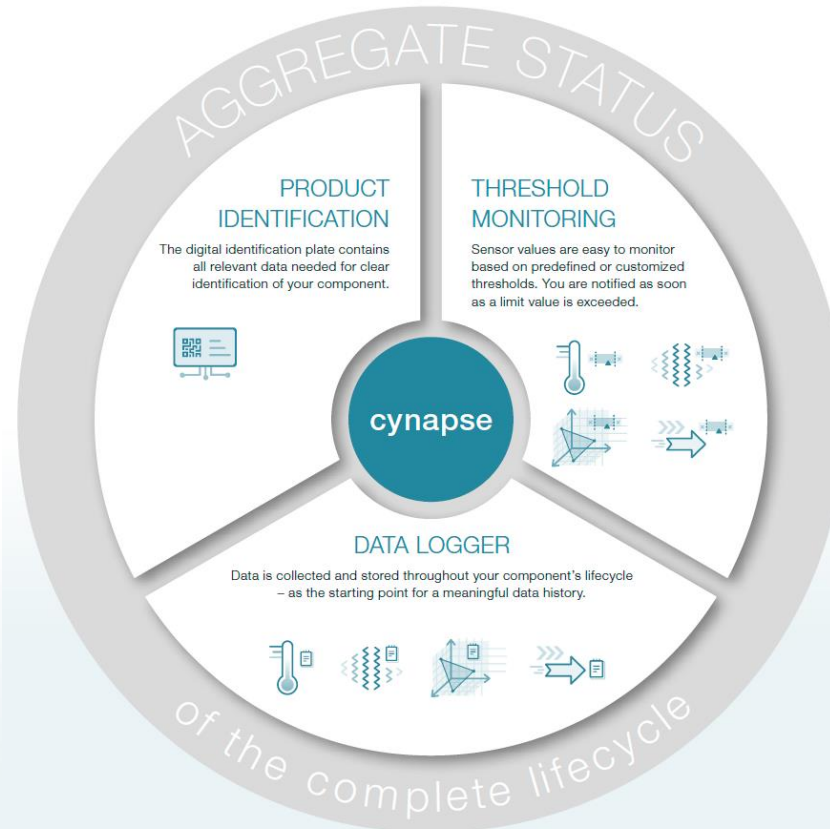
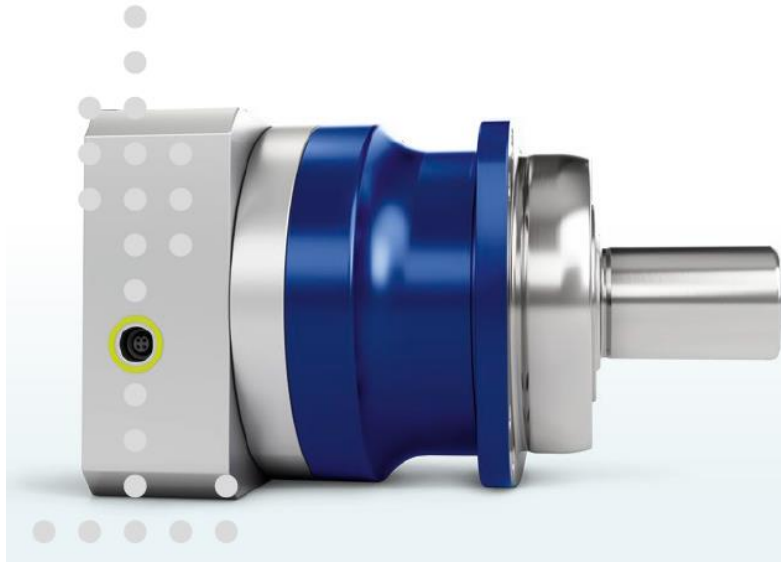
WITTENSTEIN cynapse, el reductor inteligente



- Solución de sensores integrados en instalación
- Sensor de temperatura y aceleración (3 ejes esp.)
- Memoria integrada
- CPU integrada
- Interface IO-Link
- Placa de características Digital

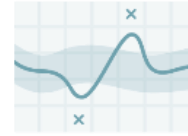
ctrlX World

WITTENSTEIN cynapse, el reductor inteligente



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WITTENSTEIN cynapse, el reductor inteligente



Detección de anomalías



Datos de uso



Almacenamiento cynapse



Gateway de datos



cynapse Teach-in



cynapse Monitor

ctrlX World

Bosch Global Software Technologies

DeviceBridge



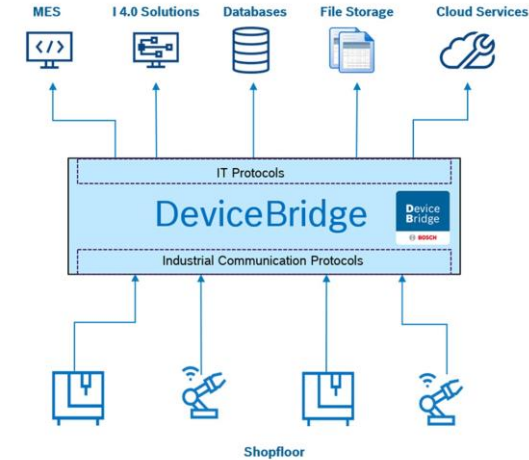
BOSCH

ctrlX
AUTOMATION

CONNECTIVITY FOR EXISTING MACHINES

SEAMLESS OT-IT INTEGRATION

Acquire data from Shopfloor and send to top floor



ADVANTAGES

- ▶ Acquire
Supports 40+ Controllers – PLC/CNC/Sensors, etc.
- ▶ Transform
Smart Data Processing at Edge
- ▶ Deliver
Send data to Data Layer or directly to 15+ IT Applications

TARGET INDUSTRIES

- ▶ Discrete Manufacturing Plants
- ▶ Process Manufacturing Plants
- ▶ Any customer having machines and equipment's
(SME to Large Enterprise)

TARGET CUSTOMERS

- ▶ For machine builders and machine operators

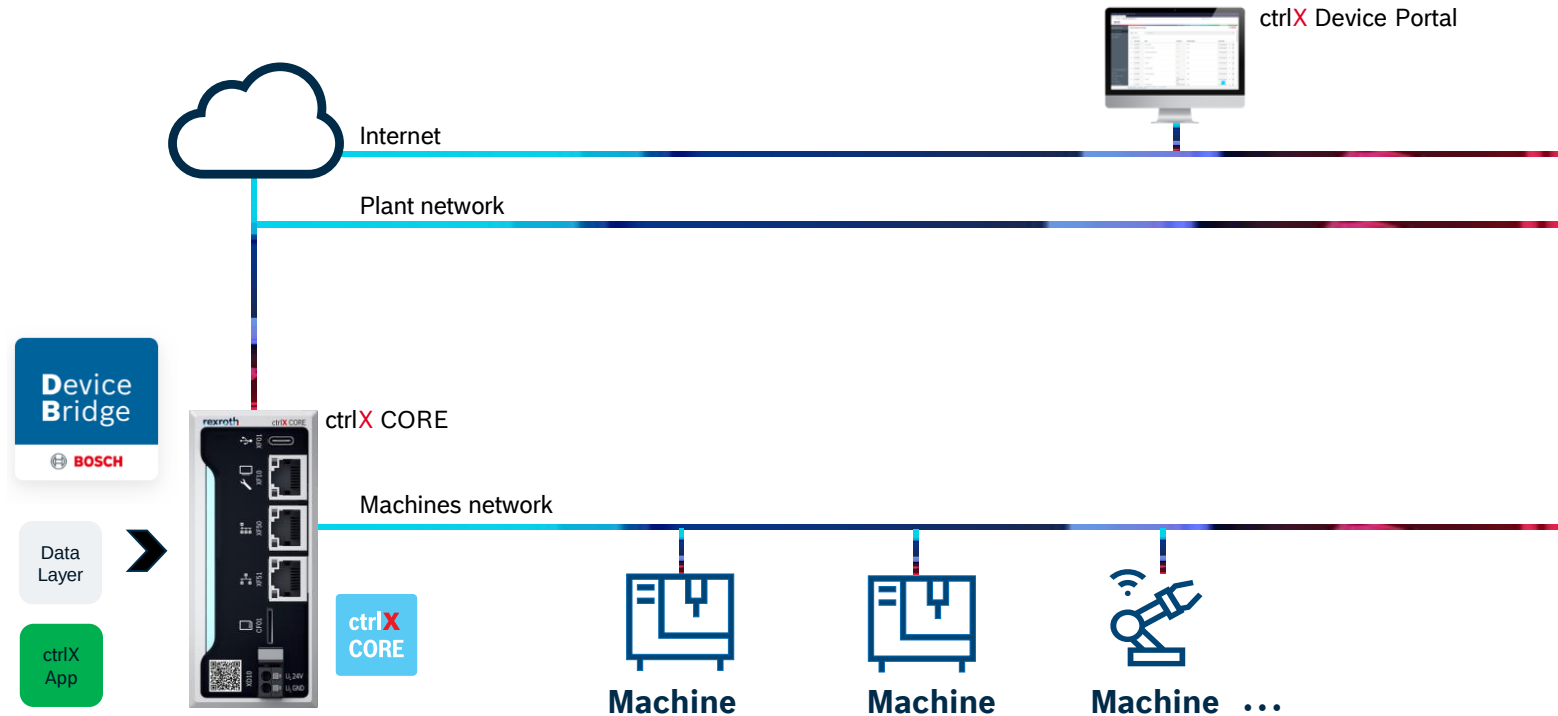


rexroth
A Bosch Company

ctrlX World

Bosch Global Software Technologies

DeviceBridge



Seamless OT-IT integration
Acquire data from Shopfloor and send to top floor

Acquire
Supports 40+ Controllers –
PLC/CNC/Sensors, etc.

Transform
Smart Data Processing at Edge

Deliver
Send data to Data Layer or directly
to 15+ IT Applications



ctrlX World

Bosch Global Software Technologies

DeviceBridge



BOSCH

ctrlX
AUTOMATION

Acquire

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A Bosch Company

SIEMENS **BECKHOFF** **Allen-Bradley**
by ROCKWELL AUTOMATION



FANUC



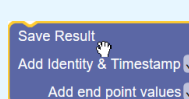
OPC UA

OPC
FOUNDATION

EtherNet/IP

Modbus

Transform



Data Model

Routing

Deliver

Data Layer



kafka

solace

INDUS 4.0

NEXEED



Node-RED



Azure IoT Hub

aws



SQL Server



mongoDB



influxdata



{REST-API}



JSON



XML



CSV

MQTT

40+ Controllers Support

- | | |
|--|---------------|
| ☐ Rexroth | ❖ Modbus TCP |
| ☐ Siemens | ❖ S7 Protocol |
| ☐ Mitsubishi | ❖ Ethernet/IP |
| ☐ Allen Bradley | ❖ MC Protocol |
| ☐ Fanuc | ❖ OPC UA |
| ☐ Beckhoff | ❖ MT Connect |
| ☐ Others... | ❖ FOCAS |
| | ❖ MQTT |

DIY Smart Pre-processing at Edge

- | | |
|--|---|
| ☐ Custom Business Logic (Blockly) | ☐ Look-Up Tables |
| ☐ Custom Data Model | ☐ Custom Expression |
| ☐ Data Formatting -Prefix, Expand, Suffix | ☐ Time-Stamp addition |
| ☐ Basic Math function | ☐ Time Zone Adjustment |
| ☐ Basic Boolean functions | ☐ String Functions – Concatenate, Trim |
| ☐ Average calculation | ☐ Data Routing |
| ☐ Threshold monitor | ☐ Trigger based collection |
| ☐ Range converter | ☐ Block Read |

15+ IT Application Support

- | | |
|---|------------------|
| ☐ ctrlX Data Layer | ❖ XML |
| ☐ Nexeed MES/IAS | ❖ JSON |
| ☐ Kafka/Solace | ❖ MQTT |
| ☐ I4.0 Apps | ❖ PPMP |
| ☐ Azure IoT Hub | ❖ REST API |
| ☐ AWS | ❖ AMQP/Rabbit MQ |
| ☐ MS SQL, MySQL, Influx and Oracle | ❖ ADO |
| ☐ Others.. | |

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Hans Michael Krause | 18/11/2022

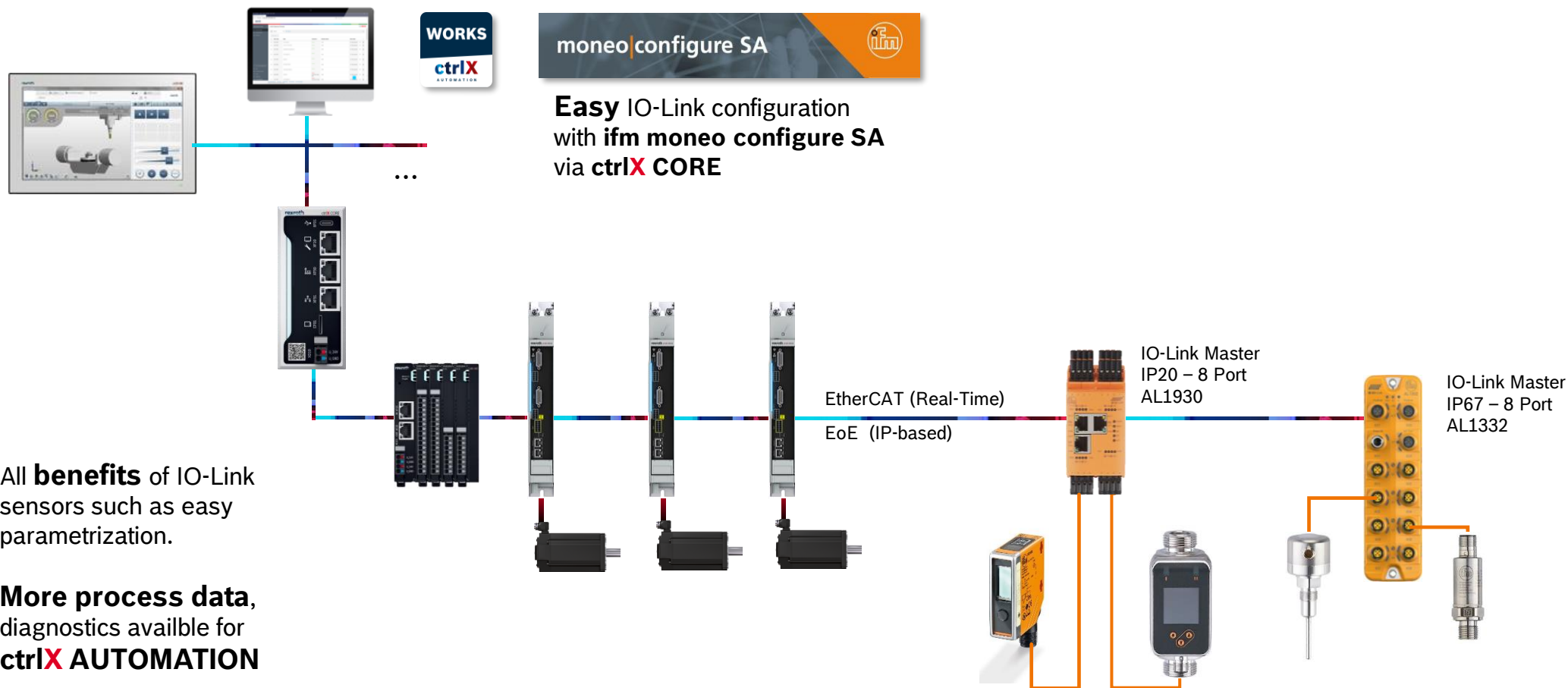
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rexroth
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ctrlX World

Connect the world of IO-Link to ctrlX AUTOMATION



ctrlX World

SICK Sensor Intelligence.

SICK is ctrlX World partner and provides data to the ctrlX Data Layer by their:

Sensors



Cameras



Safety equipment



Edge devices



SensorApps from the **SICK**
AppSpace eco-systems



Systems

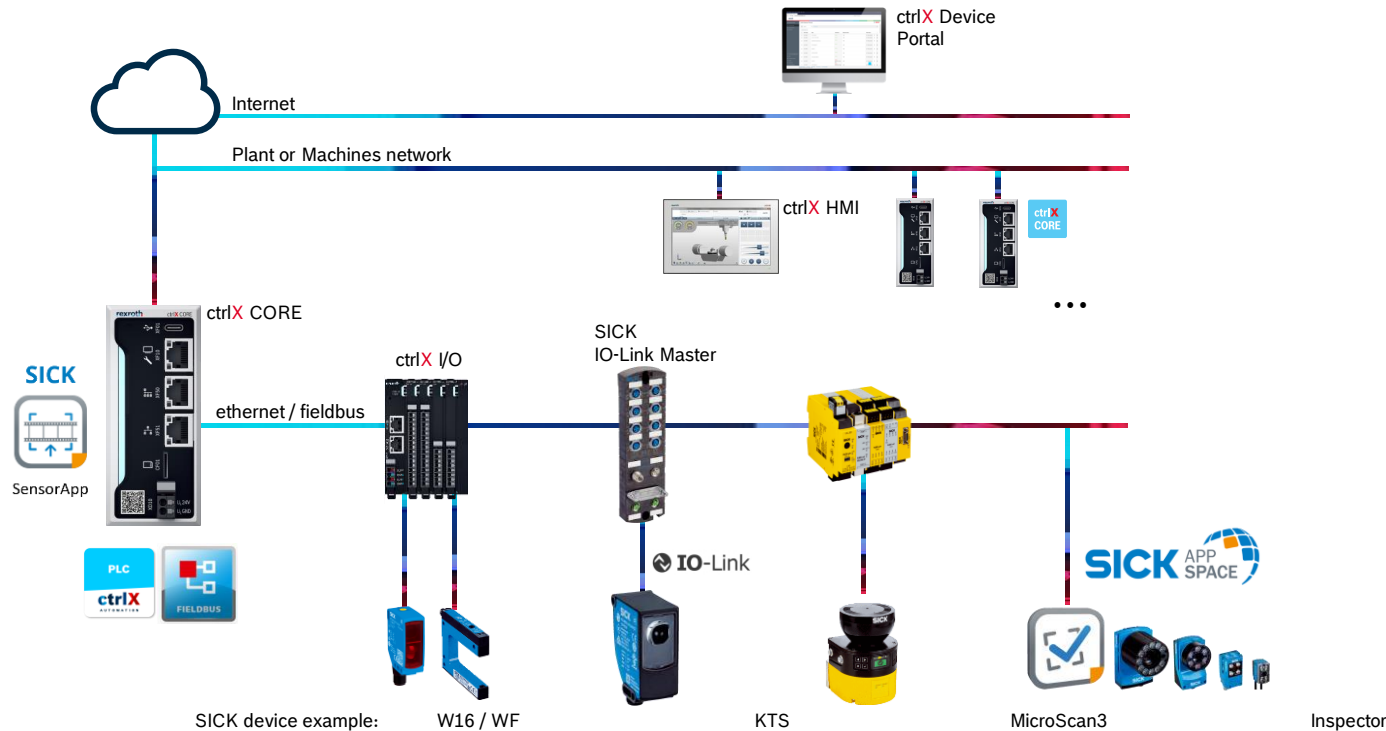


Solutions
(hardware & software)



ctrlX World

SICK Sensor Intelligence.



SEAMLESS INTEGRATION

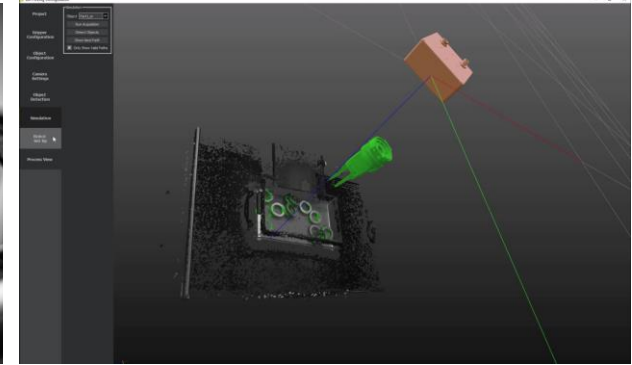
Seamless integration of data from SICK Sensors into the ctrlX Data Layer for your automation, safety or IoT application.

For any sensor interface - digital outputs, IO-Link or ethernet-based communication.

APPLICATION SOLUTION

The SICK SensorApps embedded in ctrlX AUTOMATION provides application data for smart automation and IoT solutions.

AUTOMATED HANDLING OF SHINY OBJECTS AND METAL PARTS with vision sensor and software



ADVANTAGES

- ▶ High depth of field
- ▶ Only CAD-models needed
- ▶ Passive path planning
- ▶ Collision detection in the entire image area
- ▶ Only 150 ms per path

TARGET INDUSTRIES

- ▶ Robotic applications with vision (Bin Picking, Picking From Pile, Picking From Belt)
- ▶ End of line testing

TARGET CUSTOMERS

- ▶ For machine builders and machine operators

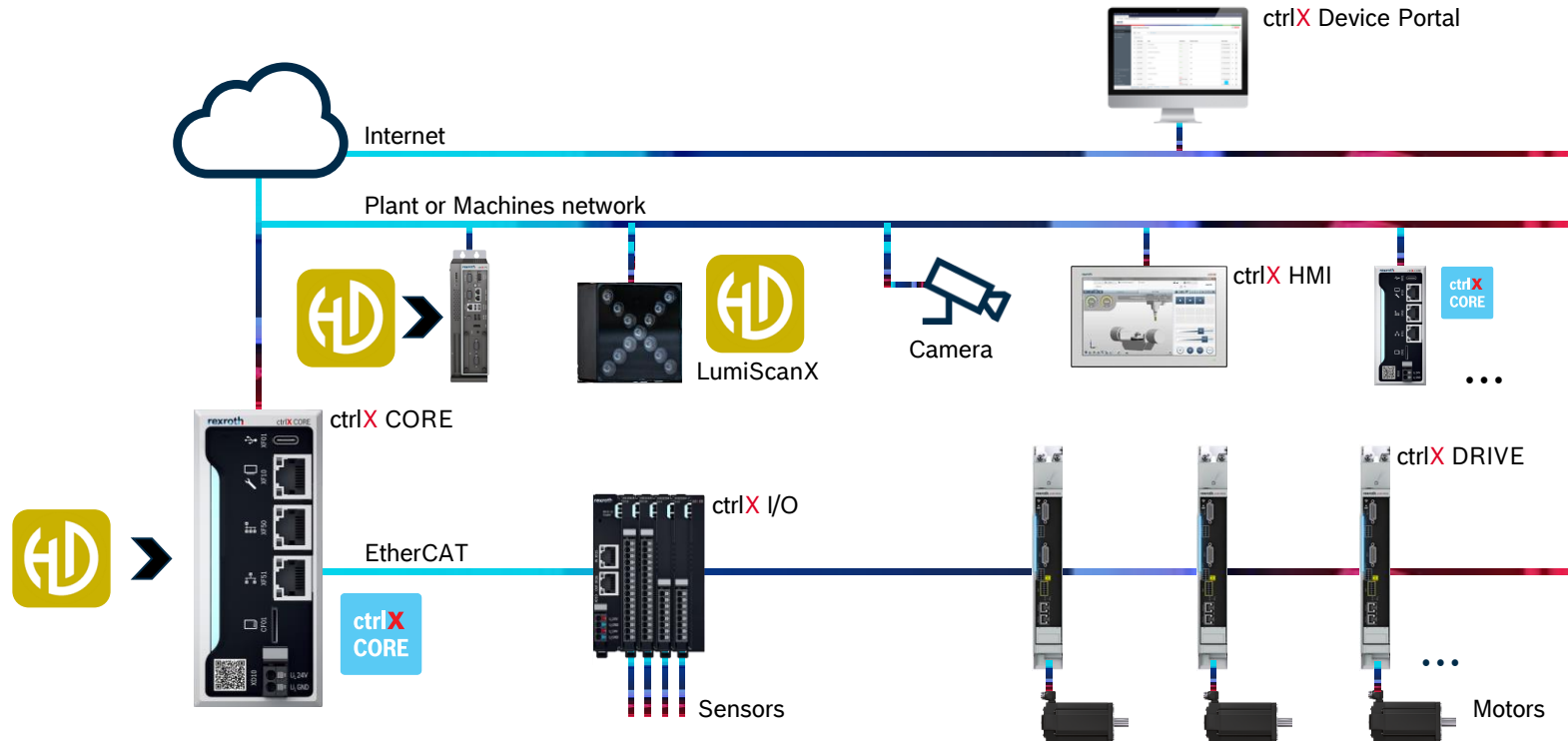
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Bin Picking of complex parts



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HD Vision Systems



HD Vision Systems

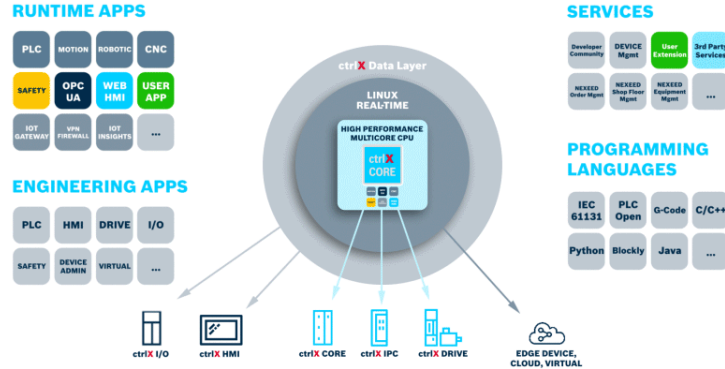
Machine Vision Fast, Easy And Precise

- ▶ Object Handling
- ▶ LumiScan BinBick
- ▶ LumiScan MotionPick
- ▶ LumiScan NeuroPick
- ▶ Quality Inspection

ctrlX AUTOMATION

ctrlX WORKS

Register → Download
Engineering + Virtual Control



<https://www.ctrlx-automation.com/ctrlx-world-register>

REVOLUTION

IN ENGINEERING

UNLIMITED FUNCTIONALITY

Unlimited expandability through apps

EASY START-UP AND ENGINEERING

Web-based and without software installation in a few minutes to the program code

FREE CHOICE OF PROGRAMMING LANGUAGE

IEC61131, PLCopen, G-code, C/C#, Python, Java, Node-RED, Blockly

EASY INTEGRATION OF OWN SOFTWARE

Own software / IP, 3 Third-party integration, open source

ONLINE SERVICE AND COMMUNITY ECOSYSTEM

VIRTUAL TESTING WITHOUT HARDWARE

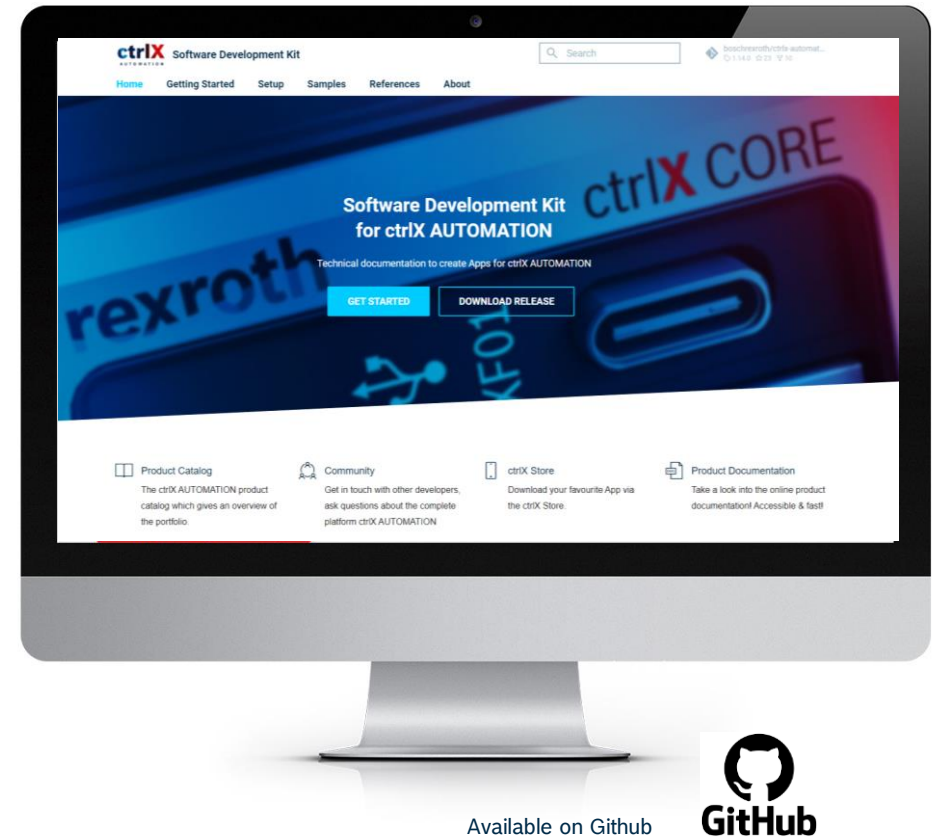
ctrlX AUTOMATION Software Development Kit (SDK)

THE SDK CONTAINS:

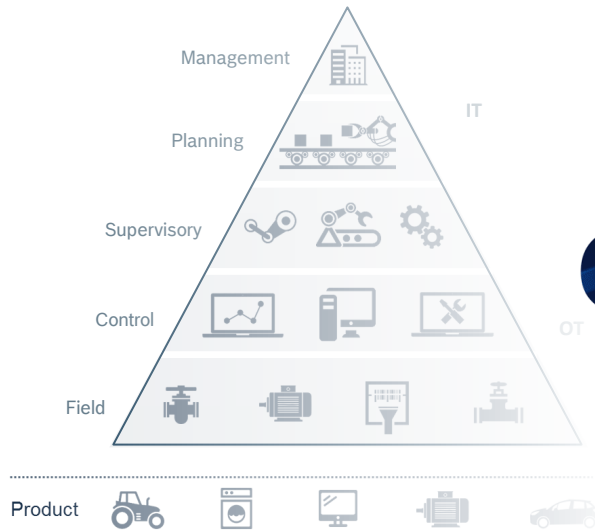
- Tools
- Libraries, e. g. for the ctrlX Data Layer access
- How-to manuals
- Application examples
- Possibility to integrate open-source software



- **How-to videos in the ctrlX AUTOMATION Community**
 - Explanation of setup of the ctrlX CORE virtual control with ctrlX WORKS engineering ([register for software download](#))
 - SDK demonstration for non real-time apps
 - SDK demonstration for real-time apps



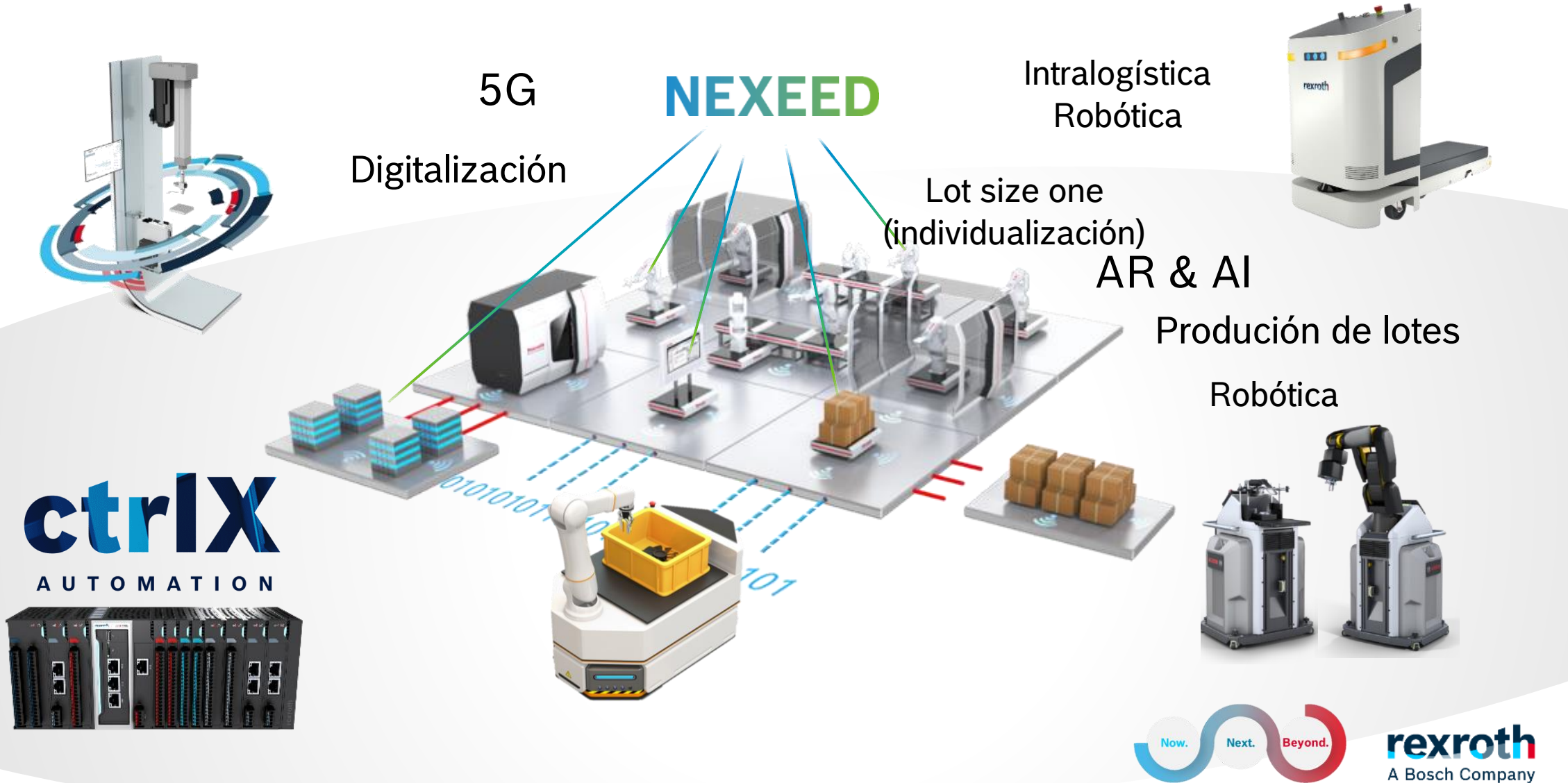
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