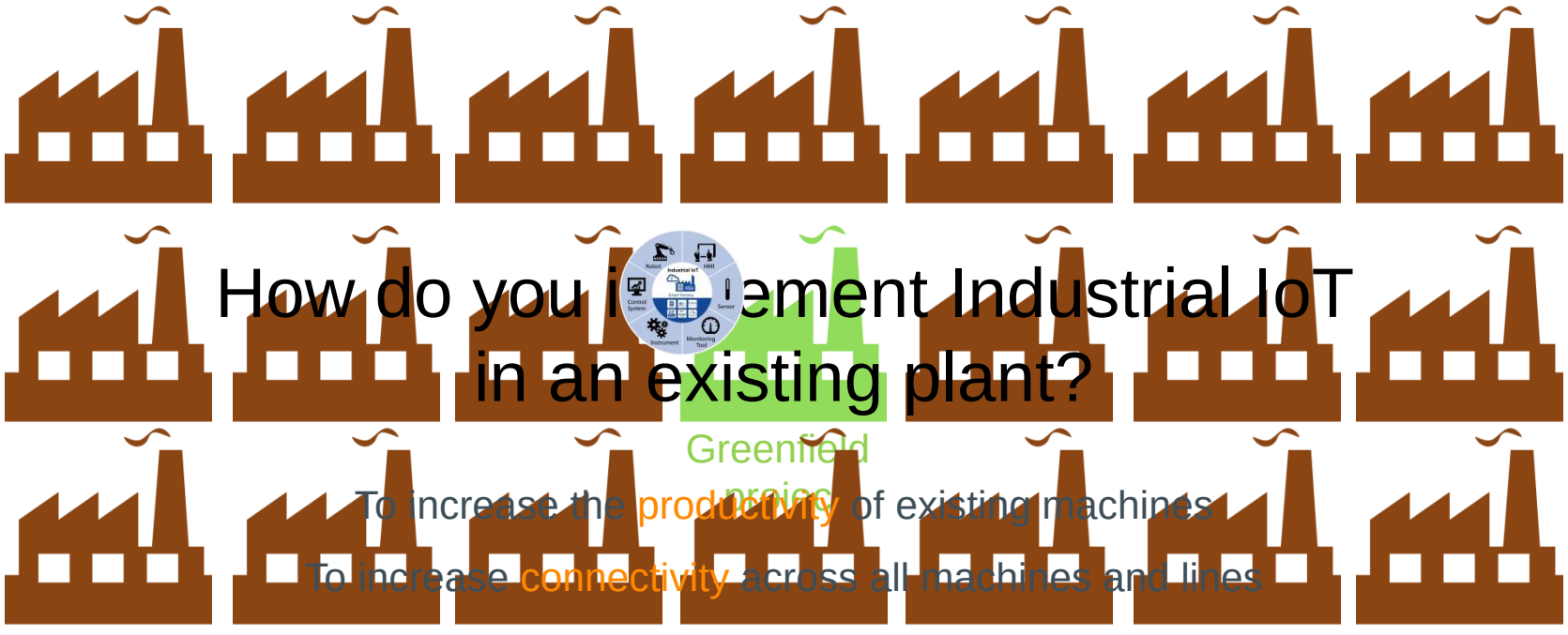
Orange Box – Optimize manufacturing operations

Industrial IoT for brownfields

Robot
HMI
Industrial IoT
Smart Factory
Control System
Sensor
Instrument
Monitoring Tool
Improve OEE
Increase transparency
React faster to market demands

Many existing plants and machines

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP



How do you implement Industrial IoT in an existing plant?

Greenfield project

To increase the productivity of existing machines

To increase connectivity across all machines and lines

Without touching the existing hardware and software

A look inside a brownfield plant

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

Variety of systems and technologies

PLC
Schneider

PLC
Siemens

PLC
Rockwell Automation

Little data transparency

Machines from different generations

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

3

Major Industrial IoT requirements for brownfield plants

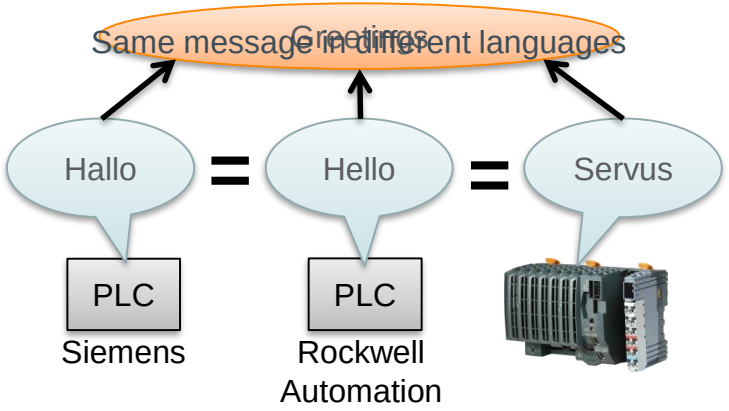
1. Transform messages into information

Variety of systems and technologies

PLC
Schneider

PLC
Siemens

PLC
Rockwell
Automation



Giving messages universal meaning
turns them into information

2. Real-time calculation of KPIs

Little data transparency

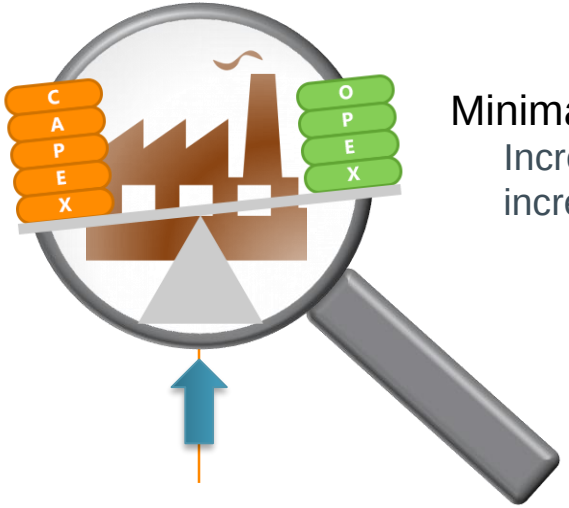
On-site calculation of KPIs
enables operators to react quickly

3. Enhancements must be economically feasible

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

Minimal capital expenditure

Keep using existing machines and automation systems



Minimal operational costs

Increase productivity without increasing personnel

Machines from different generations

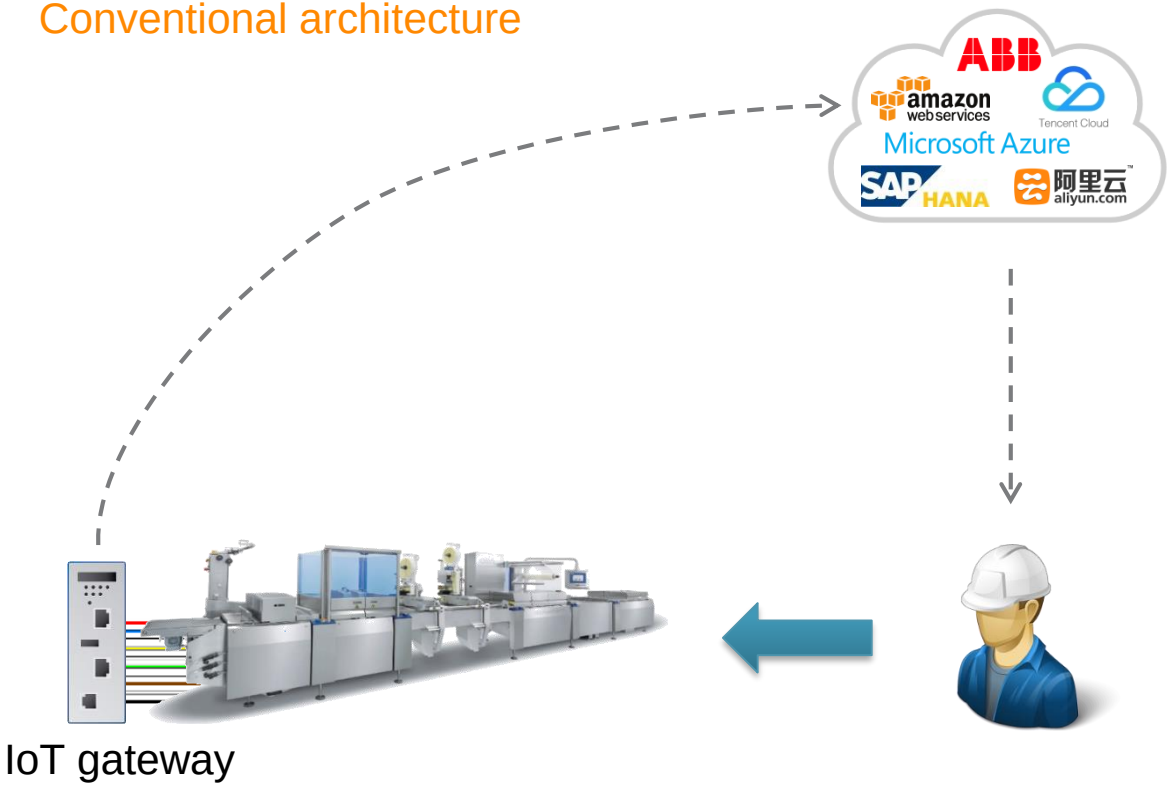
PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

How do you implement Industrial IoT in an existing plant?

How do you implement Industrial IoT in an existing plant?

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

Conventional architecture



Slow on-site reactions

Long time to get data from the cloud

Relies on cloud connectivity

No connection = no results, lost data

Reports not made for operators

Big data analytics instead of hands-on reports

High cloud operating costs

No on-site preprocessing

High storage requirements

High bandwidth requirements

Orange Box

Orange Box

Orange Box

Machine information available on site

- Independent of cloud services
- Data acquisition and processing
- User interface made for operators
- Faster operator reactions

Plug-and-run

- Easy to install
- All-in-one system
- Web-based configuration on device

Web-based HMI

- Panel, PC, smartphone, tablet

Orange Box – Concept

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

Industrial PC, HMI, PLC

mapp TECHNOLOGY

Smartphone-like Industrial IoT solution

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

OEE

Tweet

PackML

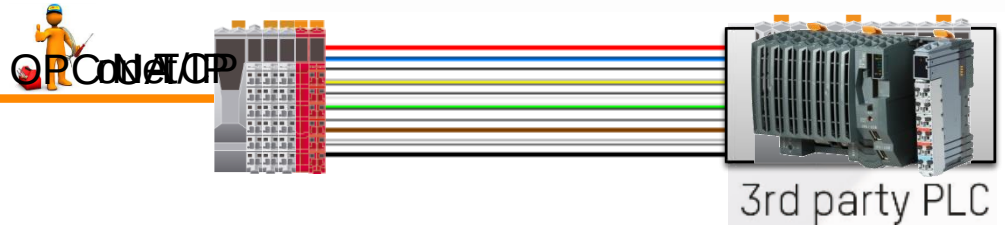
Energy

Alarm

User

Orange Box – Connectivity

Connects with Siemens PLC



PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

Range of functions

Connectivity functions

Overview

Brownfield connectivity

- ISO on TCP
- EtherNet/IP – Common Industrial Protocol (CIP)
- INA2000/ANSL
- OPC UA
- POWERLINK – X20 I/O modules

Uplink connectivity

- OPC UA
- MQTT
- Database
- Remote access

Applications and on-board functions

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

Overview

Applications

- OEE
- Messaging
- Data logger

On-board functions

- User management, alarm handling
- Update service with network share and USB drive
- System Diagnostics Manager (SDM)
- Basic reports (CSV, PDF)
- Mapping

Languages

- German, French,
- English, Italian,
- Chinese
- More languages to follow...

Data Mapping

Data Mapping

DB No.10 1.0 = Safety Door 1

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

References

Nestlé

Why Orange Box?

Improve overall equipment effectiveness (OEE)

Customer advantages

Easy connectivity to existing machines

Identify 10 most common causes of downtime

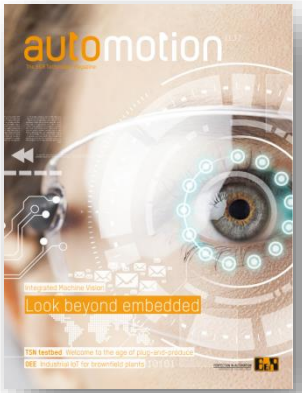
Proven OEE boost

Article about Orange Box at Nestlé

https://www.br-automation.com/en/about-us/customer-magazine/2017/20175/

http://www.sps-magazin.de/?inc=artikel/article_show&nr=128354

Continental



Why Orange Box?

Integrate existing machines and lines into IT network

Customer advantages

No impact on installed base

First data available in minutes

Quick way to boost efficiency

Article about Orange Box at Continental

https://www.br-automation.com/en/about-us/customer-magazine/

Orange Box – Award-winning solution

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

Orange Box wins independent digitalization awards

fp FOOD PROCESSING

Category: "Future Factory Enabling Technology"

http://www.fponthenet.net/article/140321/Recognising-innovation-at-the-Food-Processing-Awards.aspx

mesures
OPTIMISATION DES PROCESS INDUSTRIELS
AUTOMATISME | INSTRUMENTATION | INFORMATIQUE INDUSTRIELLE

Category: "Industrial Computing"

http://www.mesures.com/instrumentation/mesure-physique/item/14537-exclusif-decouvrez-les-laureats-des-palmares-technologiques-2017

4.0 INDUSTRIE 4.0
INNOVATION AWARD 2017

http://www.openautomation.de/industrie-40/industrie-40-award.html

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

Typical application

OEE

Overall Equipment Effectiveness

Overall Equipment Effectiveness

= OEE

Availability x Performance x Quality

OEE calculations in brownfield plants

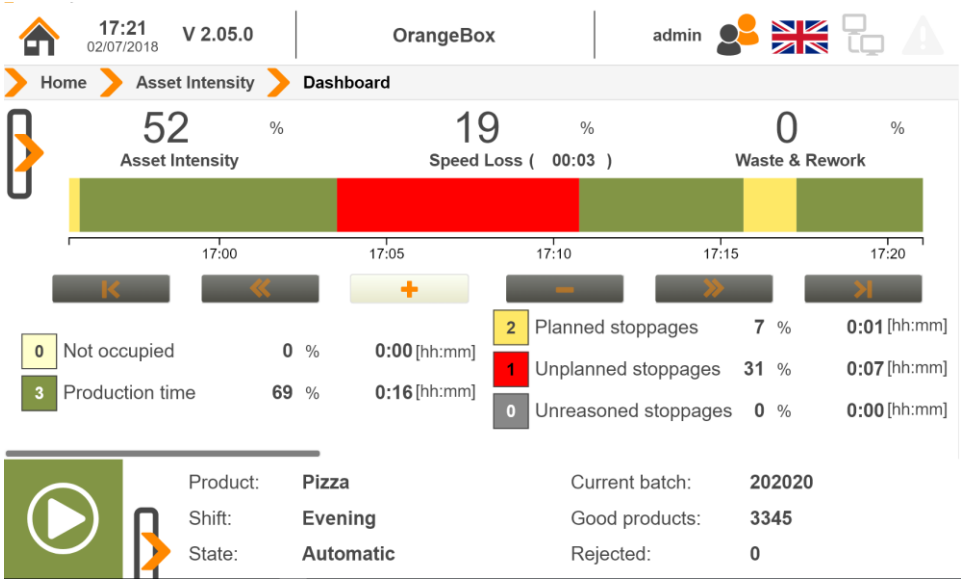
Cost-intensive and inefficient

- Performed manually
- No real-time evaluation

Data inconsistent

- Information is lost
- Quality depends on personnel

Orange Box OEE



PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

Choose the Orange Box if…

Choose the Orange Box if…

…you want to connect individual machines or lines

KPIs are calculated by the Orange Box

…you don't want to impact your installed base

No need to change or replace any existing hardware or software

…you need better data transparency

Fully automatic acquisition and analysis in real time

B&R Orange Box