



# MQTT laat uw productiebedrijf geld verdienen!

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**Industrie 4.0** Cyber Security

Industrial Internet of Things Data

Cloud IT/OT Integration

# Program

- Challenge Agility;
- Solution : MQTT;
- Solution : Sparkplug;
- Other solutions;

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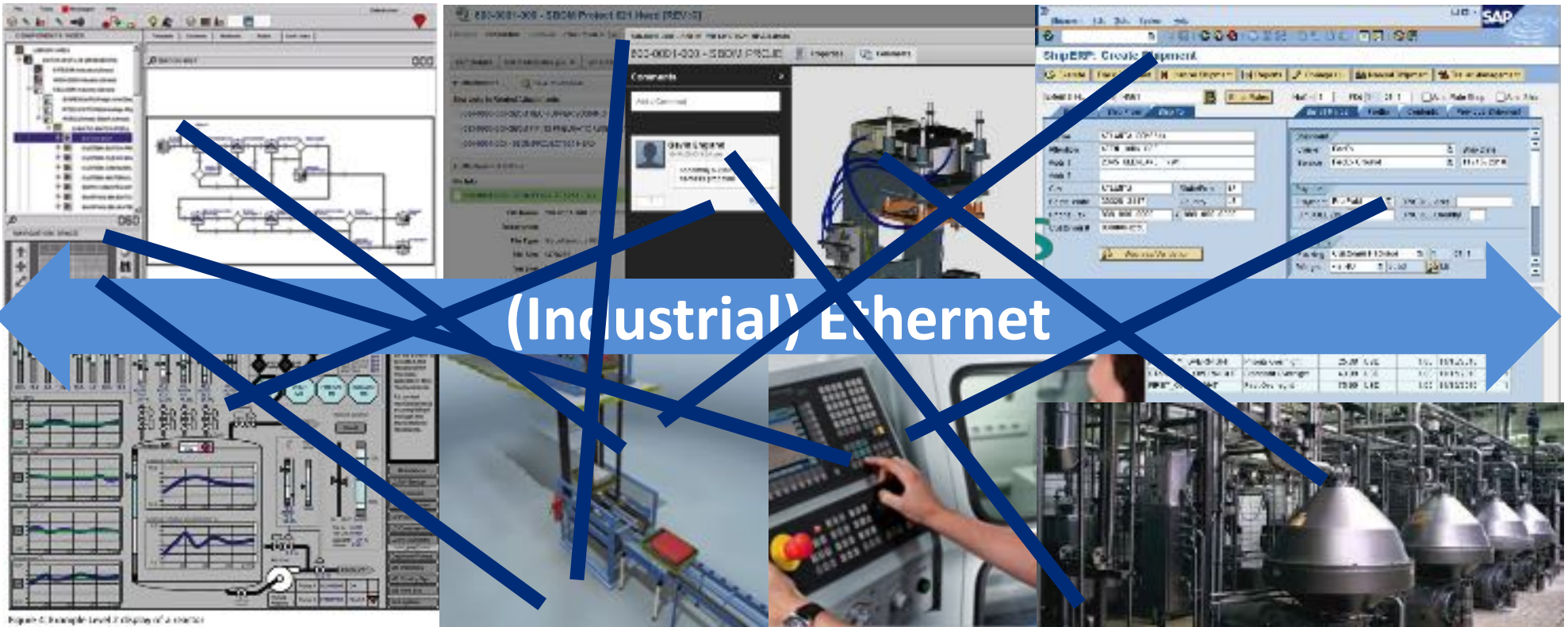
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MES/MOM

PLM

ERP



(Industrial) Ethernet

SCADA

PLC

CAD/CAM

DCS

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# Challenge Agility : IT characteristics

- In-compatible software applications.
- Business rules and process logic buried inside applications.
- Vendor lock-ins.
- Distributed ownership to different departments.
- ....

- *Business agility is the fundamental business requirement* - The ability to respond to changing requirements is the new "meta-requirement" for business. The entire architecture, from the hardware on up, must support the business agility requirement. Any bottleneck in an SOA implementation can substantially reduce the flexibility of the entire IT environment, and hence the business as well.



## MQTT laat uw productiebedrijf geld verdienen!

Wendbaarheid, souplesse, flexibiliteit, behendigheid, alertheid, scherpzinnigheid. U wilt toch ook dat uw productiebedrijf beschikt over deze kenmerken! Deze woorden beschrijven namelijk het Engelse woord agility, de belangrijkste doelstelling voor de C20 waarin bedrijven zich nu storten door bewegingen zoals Industrie 4.0, Industrial IoT en Smart Manufacturing.

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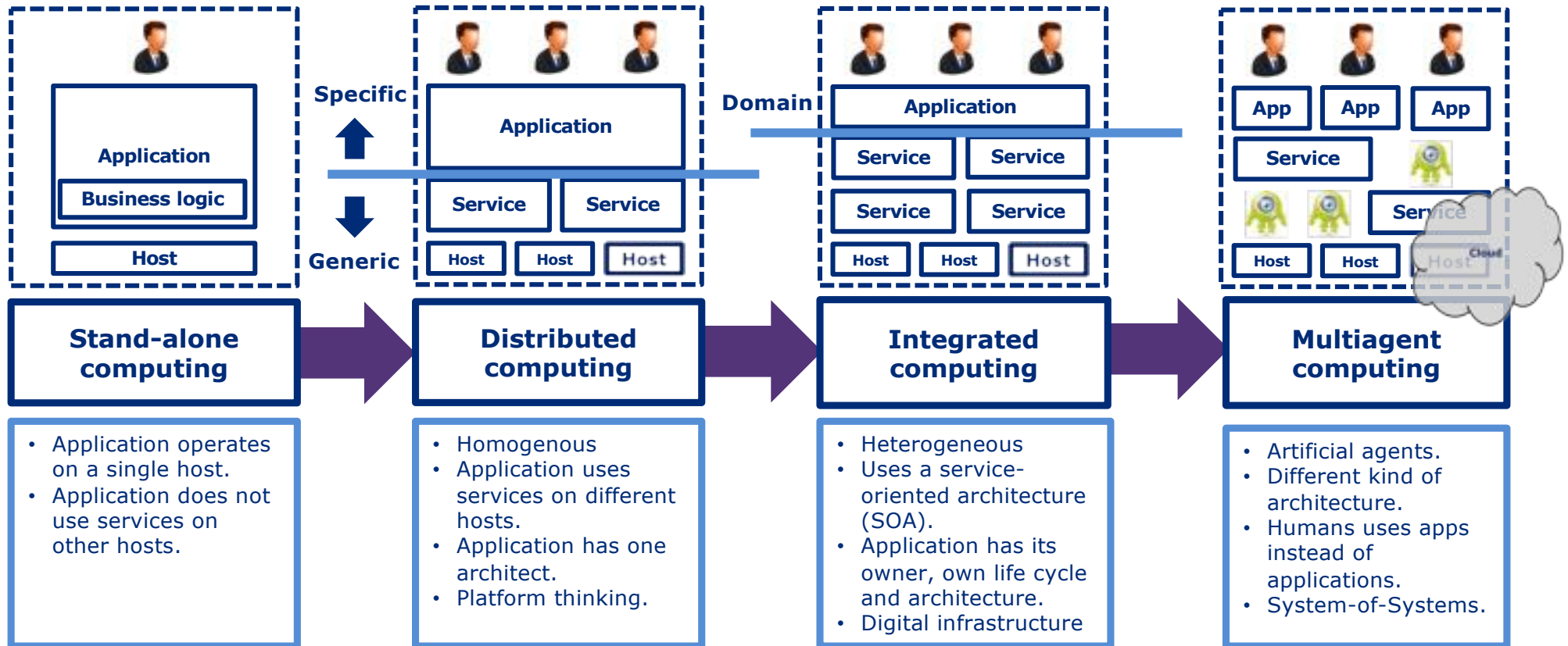
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# Challenge Agility : Digital Infrastructure



# Challenge Agility : Service integration

- Loosely coupled;
- Reuse;
- Extensibility.

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# MQTT : Introduction

- MQTT (MQ Telemetry Transport).
- MQTT is a lightweight publish/subscribe protocol with reliable bi-directional message delivery.
- Invented in 1999 by Andy Stanford-Clark (IBM) and Arlen Nipper.
- IoT platform suppliers prefer to use MQTT.



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# MQTT : Key aspects

- Designed to handle high volumes of data in low bandwidth networks.
- Small code footprint.
- Runs on top of TCP/IP.
- Both client and broker need a TCP/IP stack.
- Avoids polling, it is Event oriented.
- Recovery, store and forward, and publish/subscribe are part of the implementation (no need to implement in the application logic).

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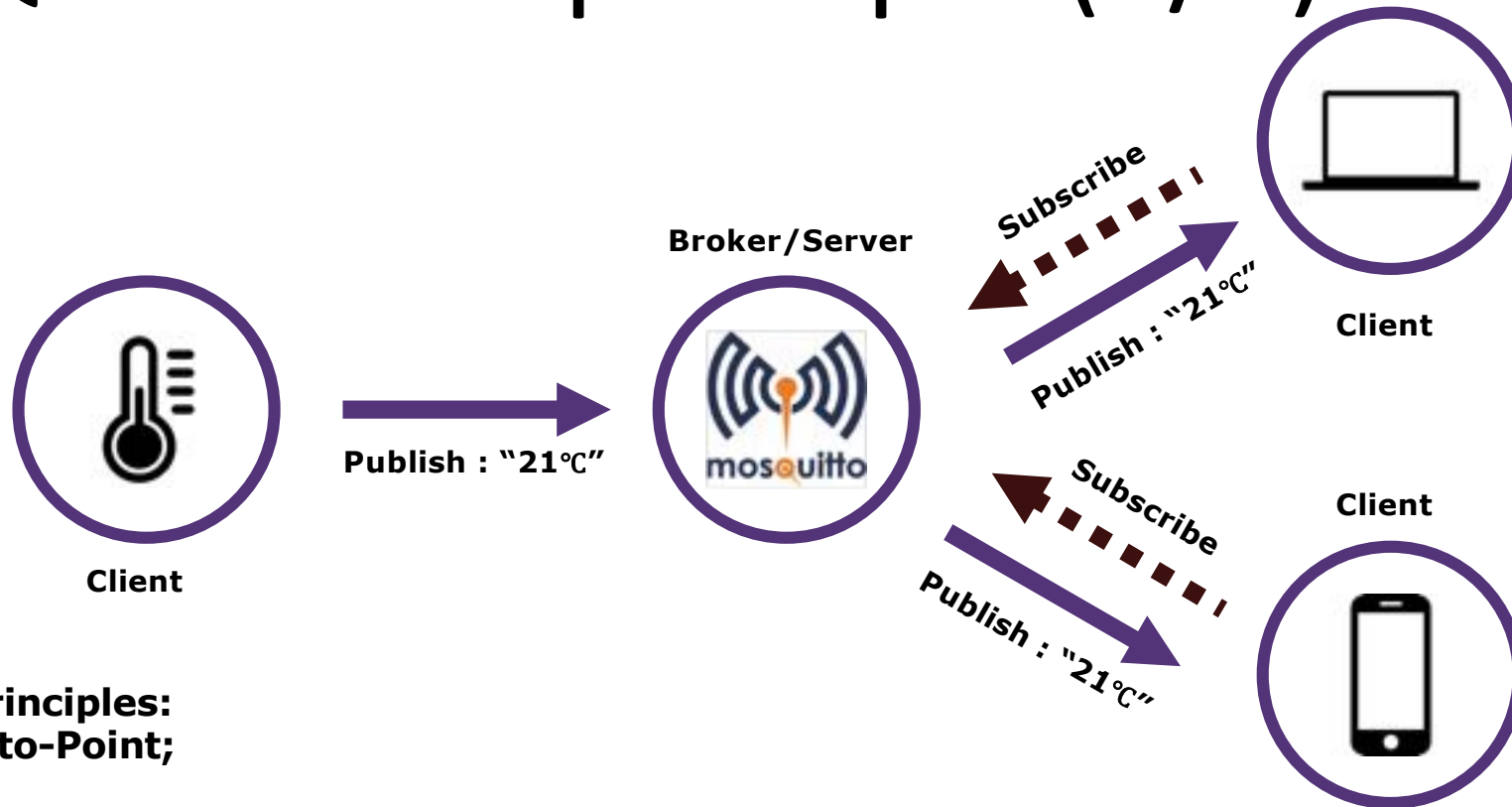
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# MQTT : Basic principle (1/2)



- Other principles:**
- Point-to-Point;
  - Bus.

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# MQTT : Basic principle (2/2)

- Space decoupling: Publisher and subscriber do not need to know each other (by ip address and port for example).
- Time decoupling: Publisher and subscriber do not need to run at the same time.
- Synchronization decoupling: Operations on both components are not halted during publish or receiving.

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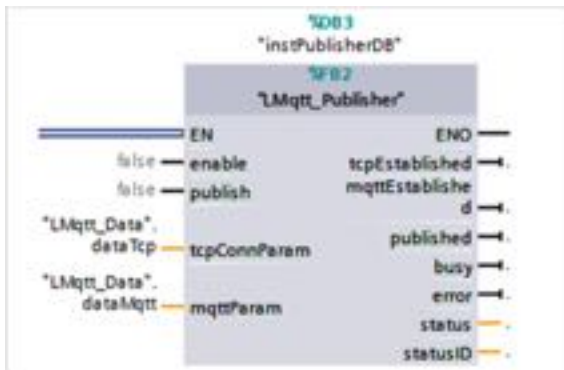
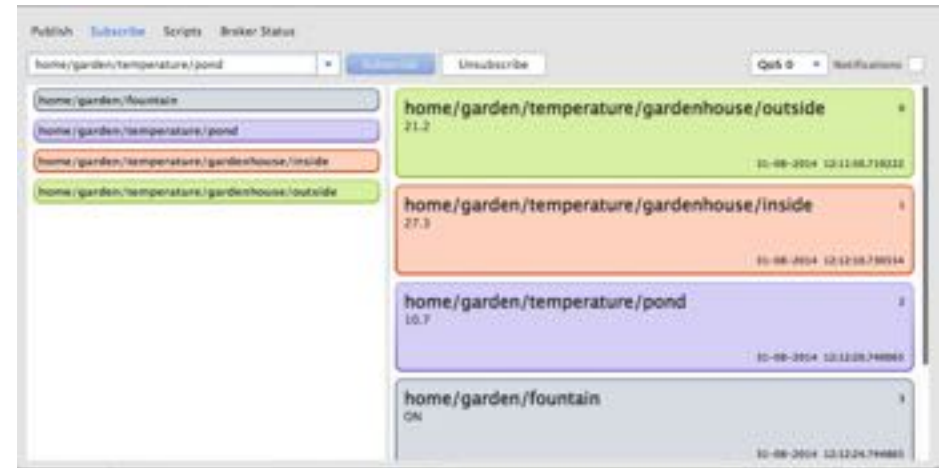
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# MQTT : Clients

Client types	Examples
Computer applications	MQTT.fx
Apps	MQTTTool MQTT Buddy
PLC applications	S7-1500 (Only publisher)



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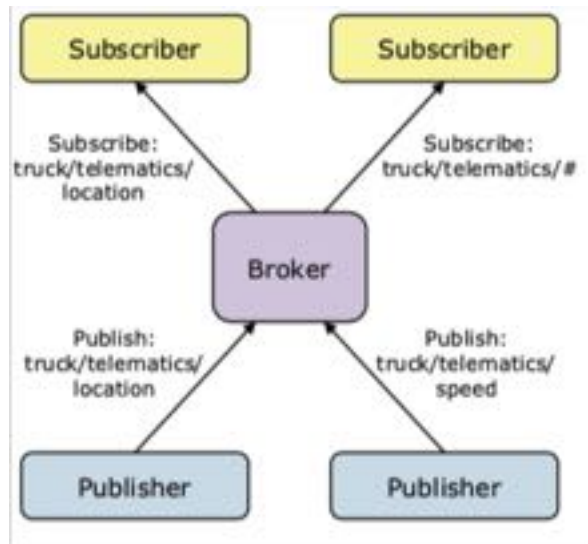
# MQTT : Servers

- Mosquitto
- IoT platforms:
  - IBM Watson;
  - AWS IoT;
  - Microsoft Azure;
  - ...



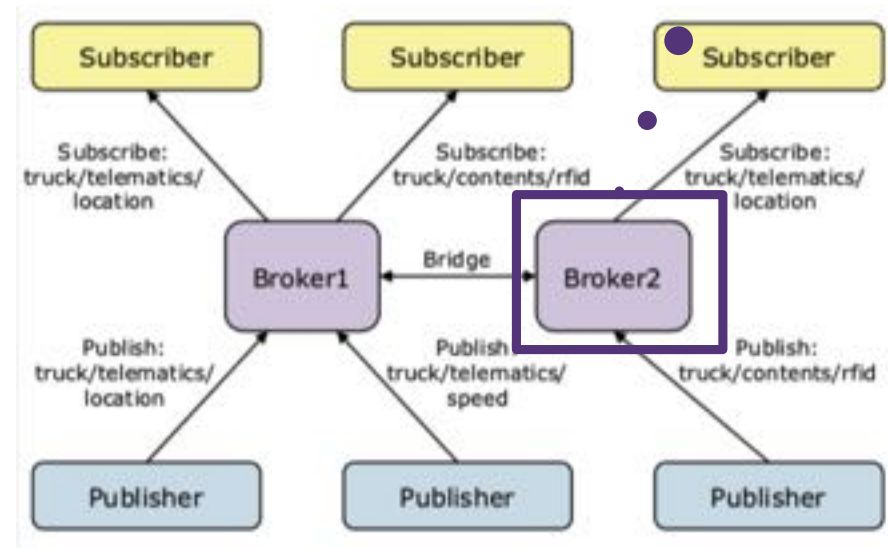
# MQTT : Server configurations

Simple



Extended

Edge/Cloud



# Sparkplug

- Define an MQTT namespace;
- Define an MQTT payload;
- Define an MQTT state management.



## Sparkplug

MQTT Topic &  
Payload Definition



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# Other solutions

- OPC UA;
- HTTP.

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# Questions



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# Introduction : Bert van der Linden



## Experience

- Traditional industrial automation and communication (PLC programming, SCADA, MES).
- Design of control software.
- PLC Software quality.
- IoT and Industrial IoT.
- Smart manufacturing and Industrie 4.0.

## Activities

- Design, sell and conduct technical training.
- Consultancy for end-users but also for vendors.
- Write study books about industrial automation and communication.
- Participate in several international working groups, like PI International, PLCopen and Industrial Platform Cybersecurity.
- Speaker on conferences, events and fairs.
- Trendwatching.

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