Embedded Intelligence for the Next Wave of Smart Systems

Opportunities and Challenges on the Edge

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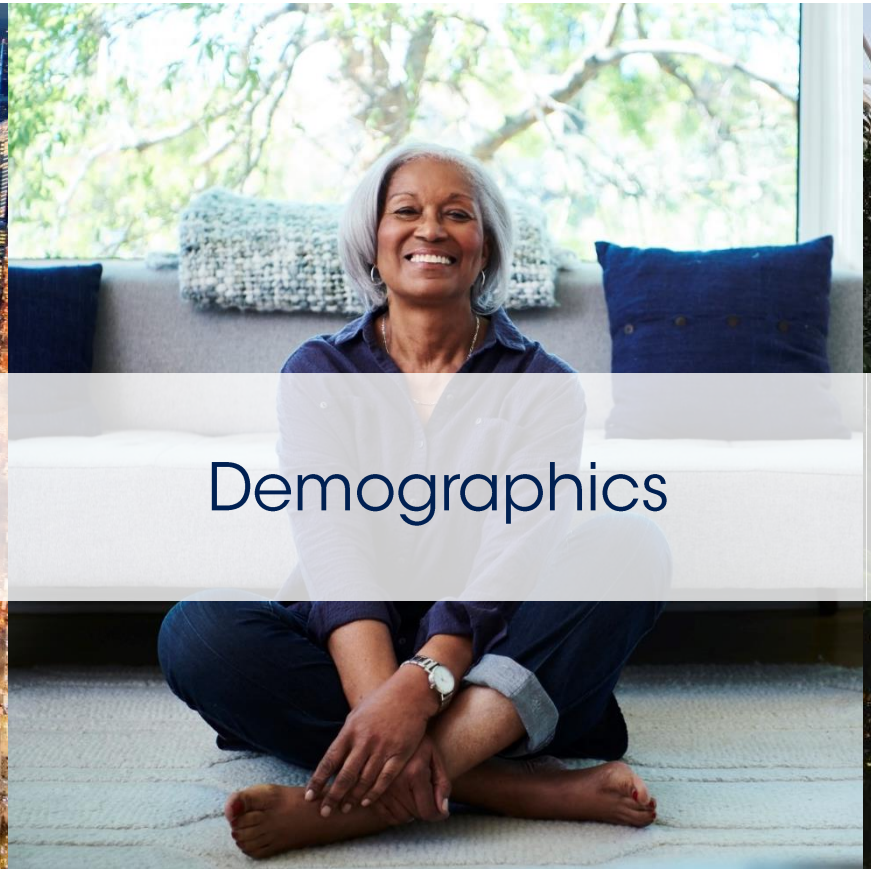
The IoT Movement

Why Do We Need

Intelligent Smart Systems

Urbanization



Demographics

Environment

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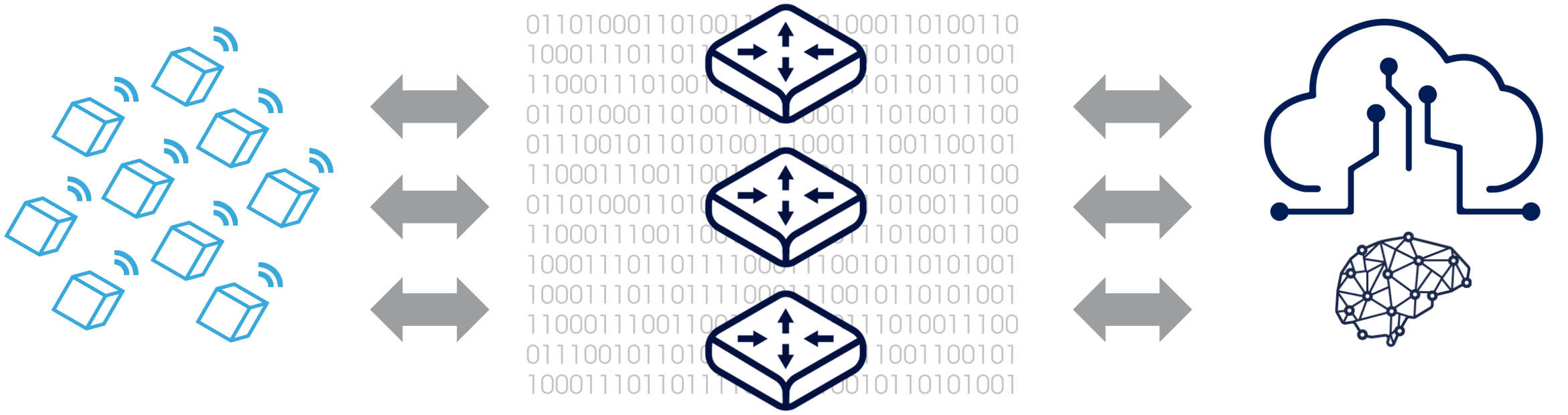
Smart System Challenges

the “Traditional” Centralized Approach

IoT devices | Gateways | Cloud



Collect and Send Data

Protocol Translation and Device Management

Big Data and Heavy computation

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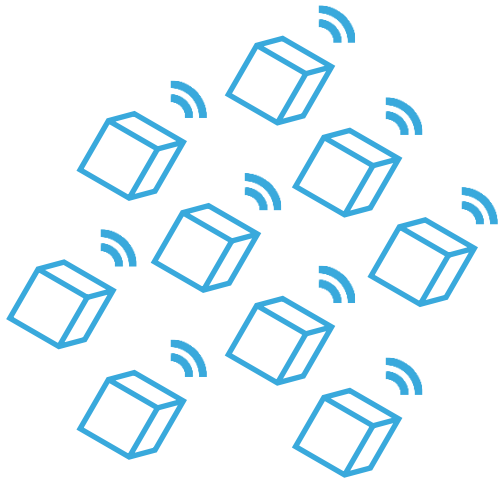
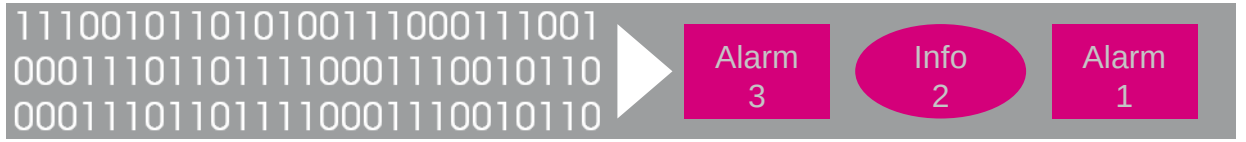
Smart System Challenges

Constraints of Centralized Data Processing



Mission Critical Functions

Bandwidth Limitations



Privacy and Security Considerations

Power consumption

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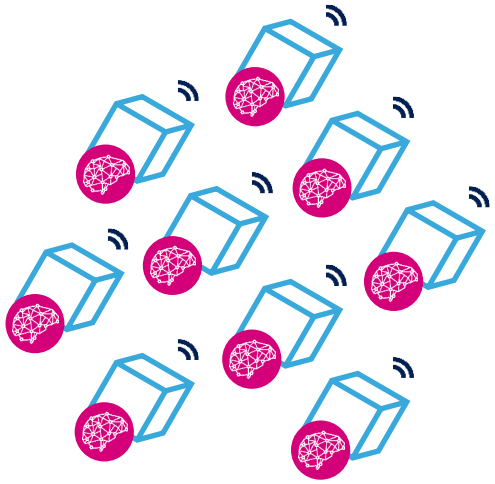
Smart System Optimization

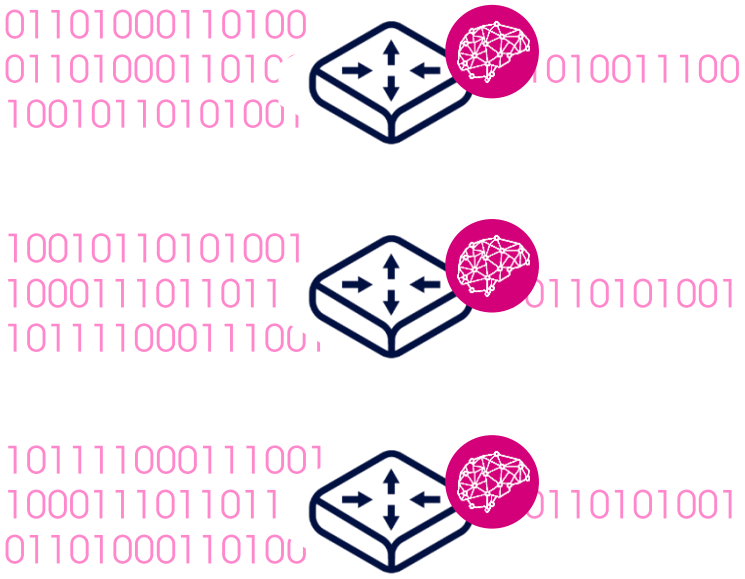
Moving the Intelligence to the Edge

IoT devices with AI



Sense, Connect and Decide

Gateways with AI



Local Processing of Data

Cloud

Optimized computation and Advanced Analysis

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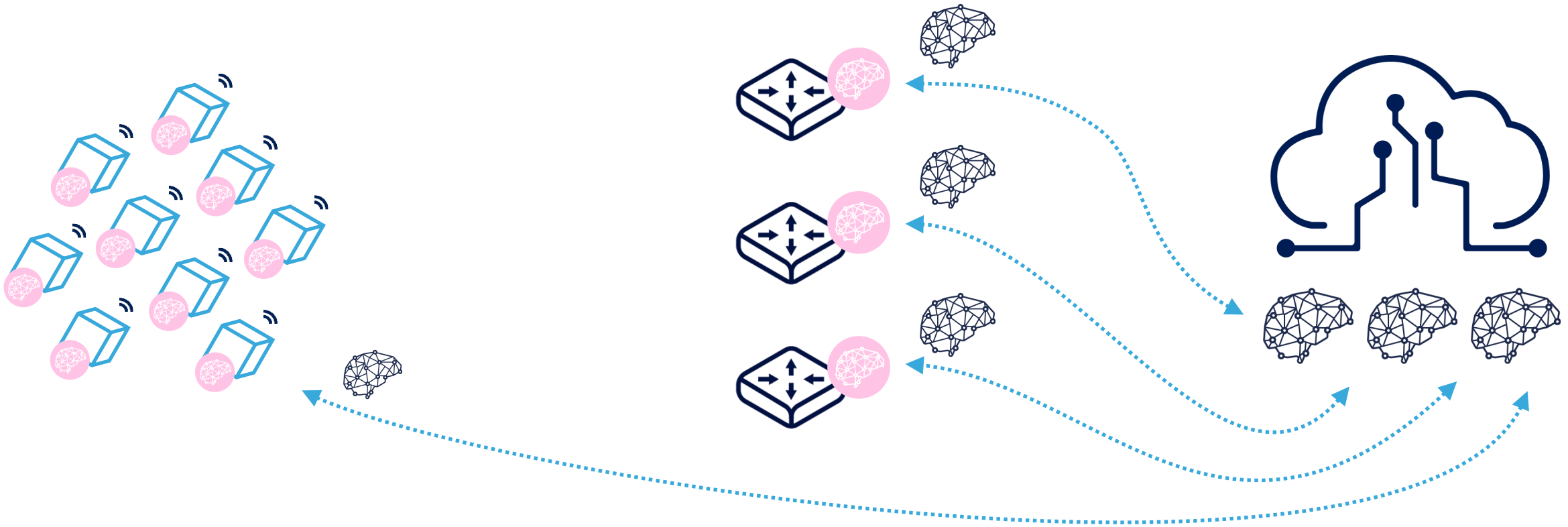
Smart System Optimization

Continuously Improves over the Time



Improved Neural Network models loaded back into IoT devices and Gateway
to improve Smart System performances

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How is the industry addressing these challenges and opportunities?

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An Ecosystem of Industries

Cloud industry

Lower barriers
to create new services

Semiconductor industry

Lower barriers
to develop products

Telecom industry

Lower barriers
to be connected

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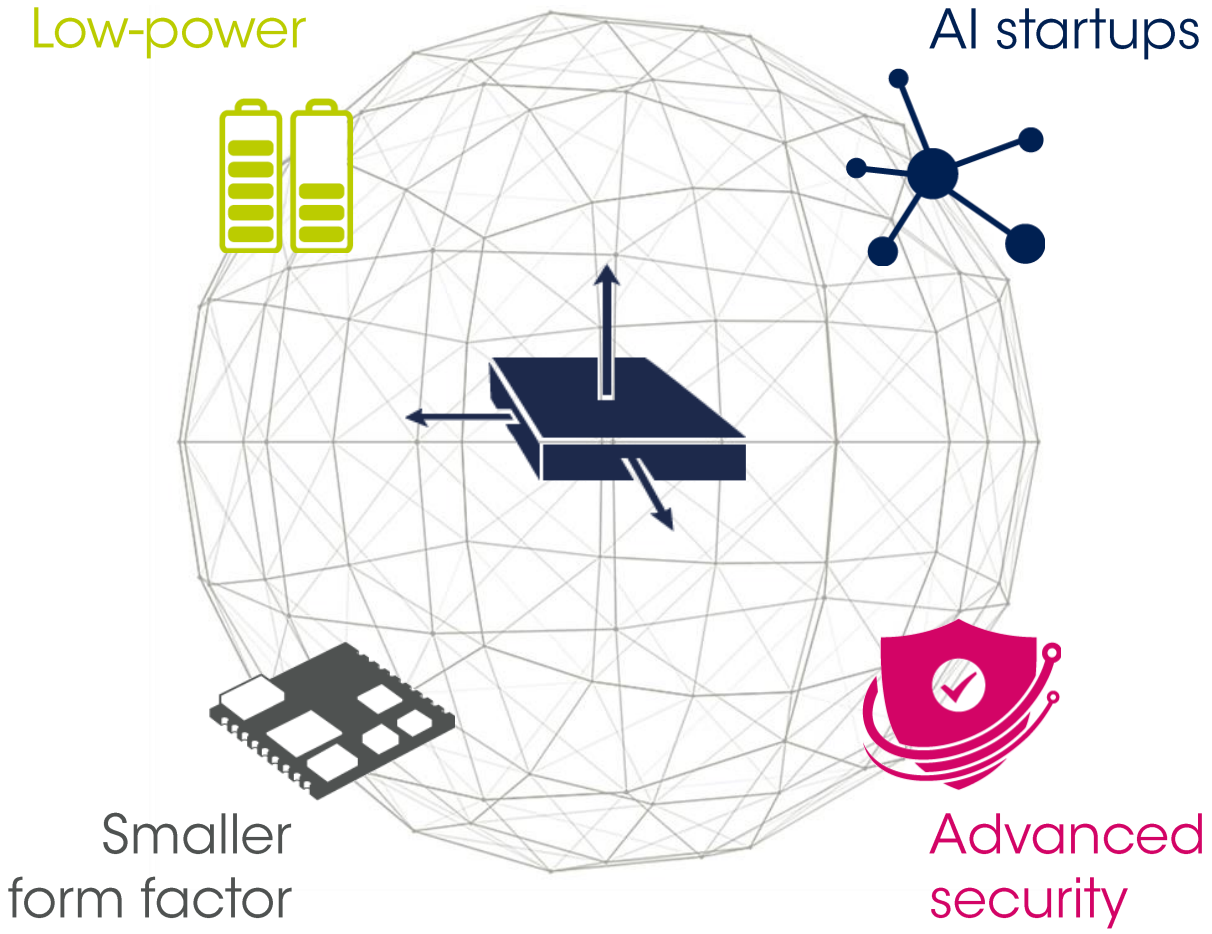
Sensor Evolution and Proliferation

Smart Sensors
are Becoming even Smarter



Cloud Service Providers

aws

Baidu Cloud

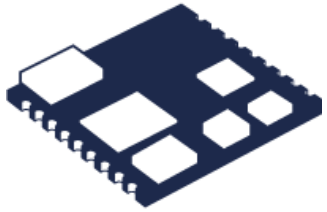
Alibaba Cloud

Microsoft Azure

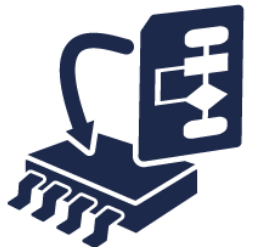
Google Cloud

Tencent Cloud

IBM



IoT platforms



RTOS

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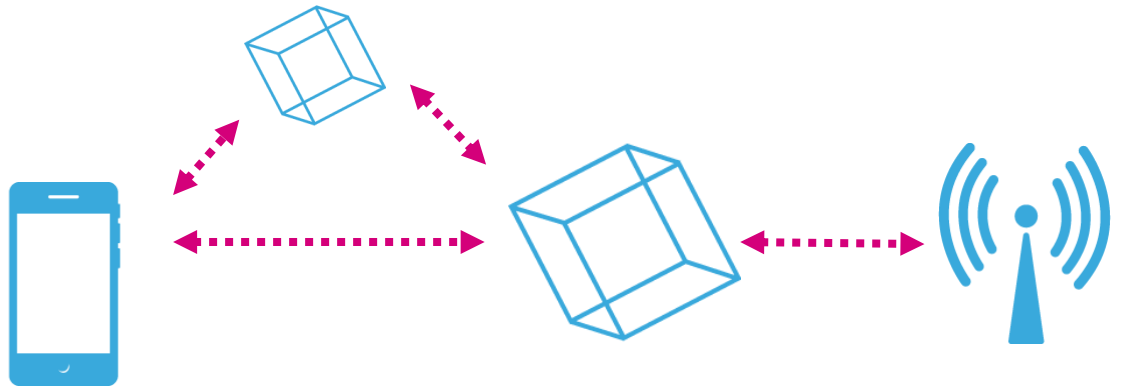
Bringing
all Connectivity Options

From short to long range communication



Bluetooth SMART

Wi Fi

LoRa

Lte
LTE-M NB-IOT

THREAD

sigfox

6LoWPAN

5G: a Game Changer

with New Services Capabilities

5G

Faster Speed

Higher Capacity

Lower Latency

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Opportunities and Use-Cases

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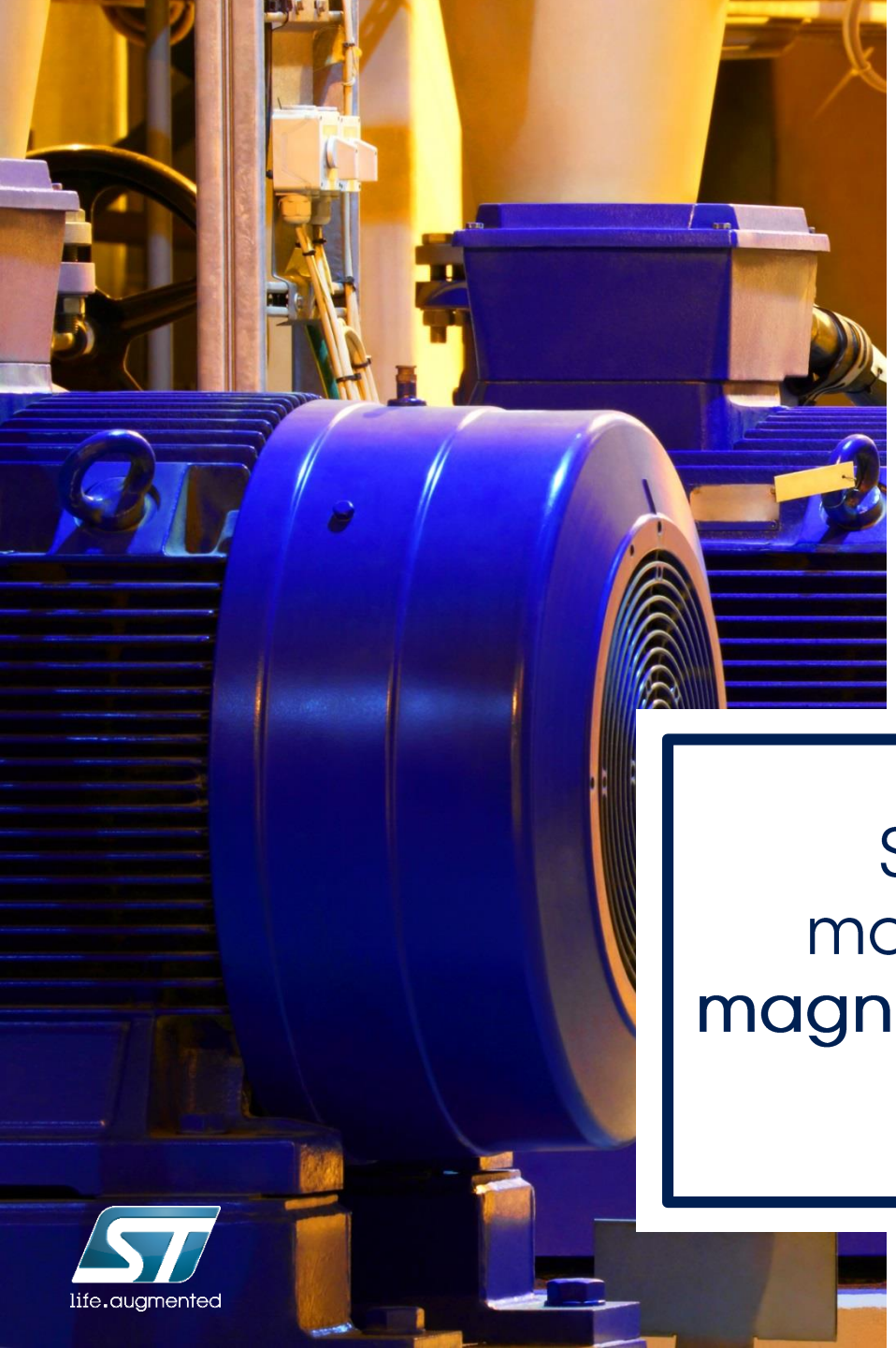
Home Appliances

Business opportunities could include selling a wider range of appliances, parts and maintenance, providing food/groceries, media, ecommerce.

Smart Industry



Sensors can be placed on any motor, monitoring its **vibration**, **temperature**, and **magnetic field** against specified values so it can **predict potential failure**.

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Smart Industry

The **AI used in Smart Buildings** can learn **to better predict** when an elevator breakdown is likely to occur and/or servicing is needed.

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Automotive

Adding **sensors, communication and intelligence** will bring safer and more efficient transportation.
Cars will be able diagnose problems early, schedule service appointments and run over the air updates

Smart Industry

Machine-vision tools to find microscopic defects in products at resolutions **well beyond human vision.**
Once on line, the computer also processes the information and **learns from what it sees**.

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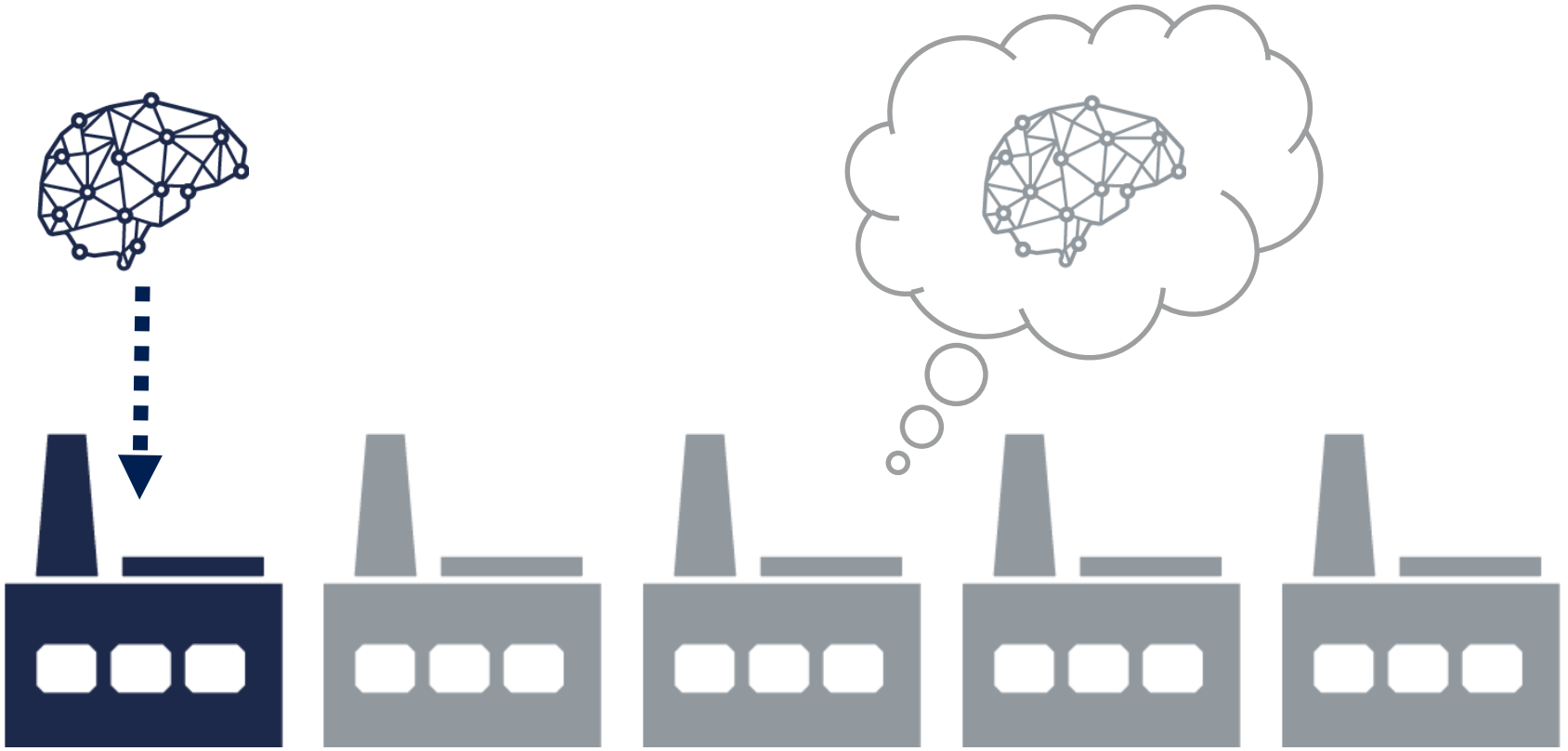
Smart Industry Challenges Remain

Significant gap lies between an organization's "ambition and execution"



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Source: Boston Consulting Group

Intelligent Smart Systems should Preserve our Privacy

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