



Techday

Taiwan | 2023

OUR TECHNOLOGY STARTS WITH YOU

**Sub-track III –
IoT & Connectivity Presentation**



life.augmented

Enabling AI with ST solutions

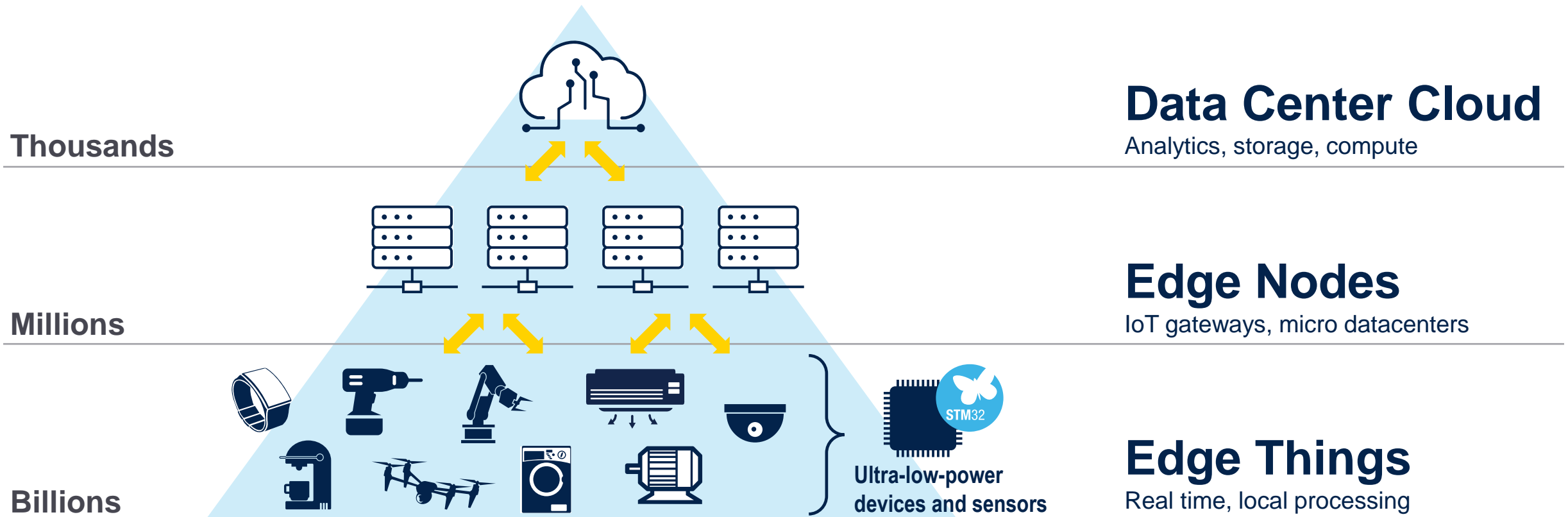
Ryk Liu

AI FAE, AI Competence Center

STMicroelectronics

Distributed artificial intelligence approach

Leverage billions of devices at the Edge!



AI application processing requirements

Low



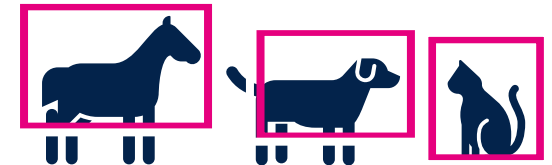
- Sensor analysis
- Activity recognition (motion sensors)
- Stress analysis or attention analysis

Medium



- Multiple Objects Detection (low resolution/frame rate)
- Face/object analysis (e.g., face detection)
- Audio (keyword spotting, scene detection)

High



HORSE + DOG + CAT

- Multiple Objects (high resolution/frame rate) detection/classification/tracking
- Speech (sentences) recognition
- Speech synthesis

Smart Sensors / STM32

next generation MCUs/MPUs



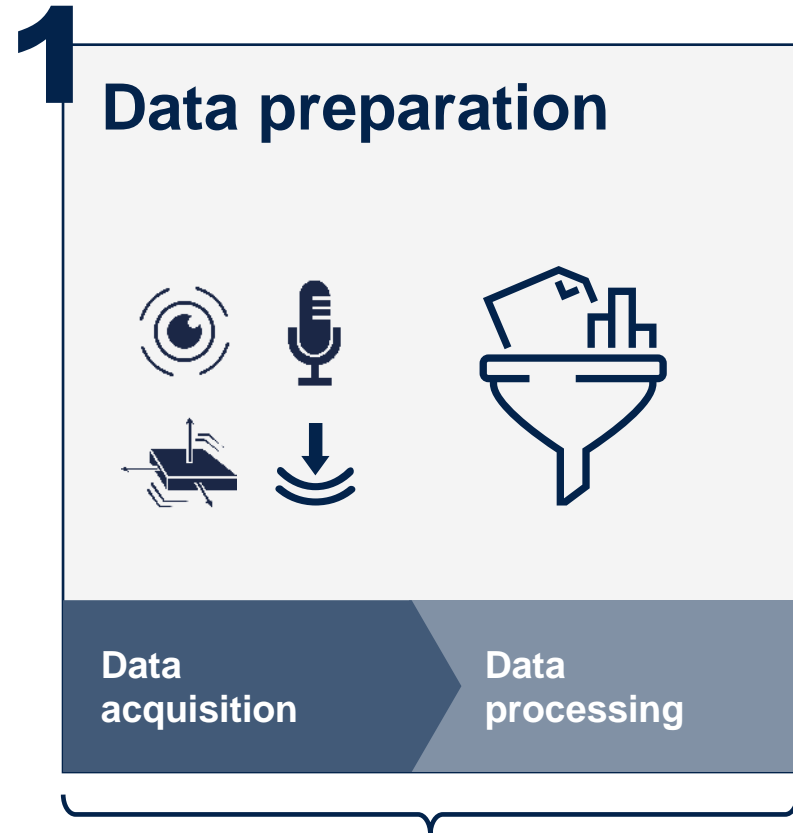


C code generator

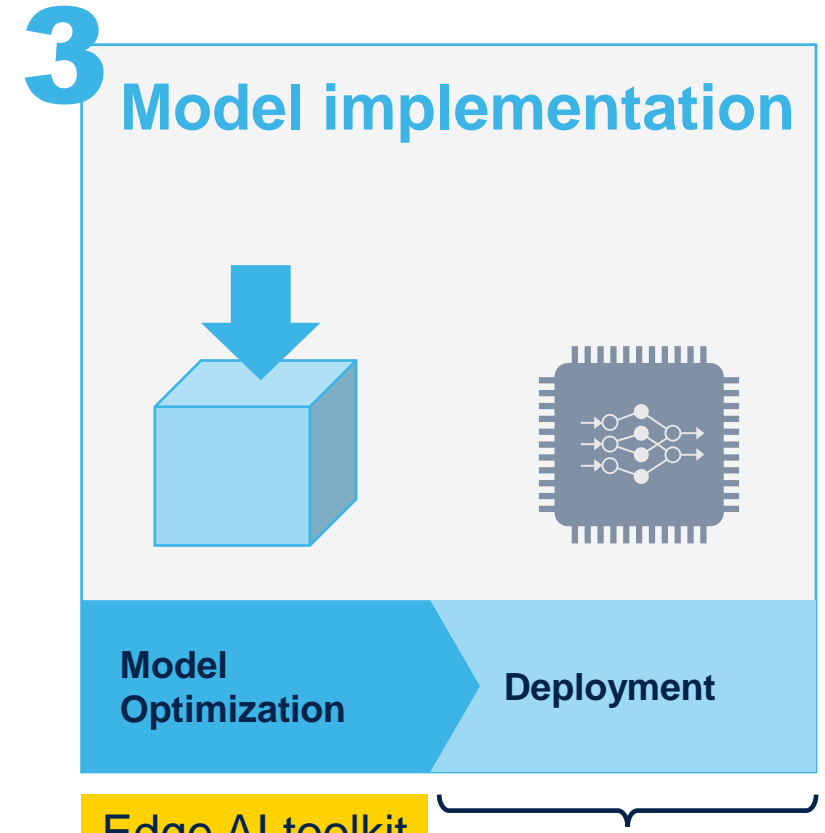
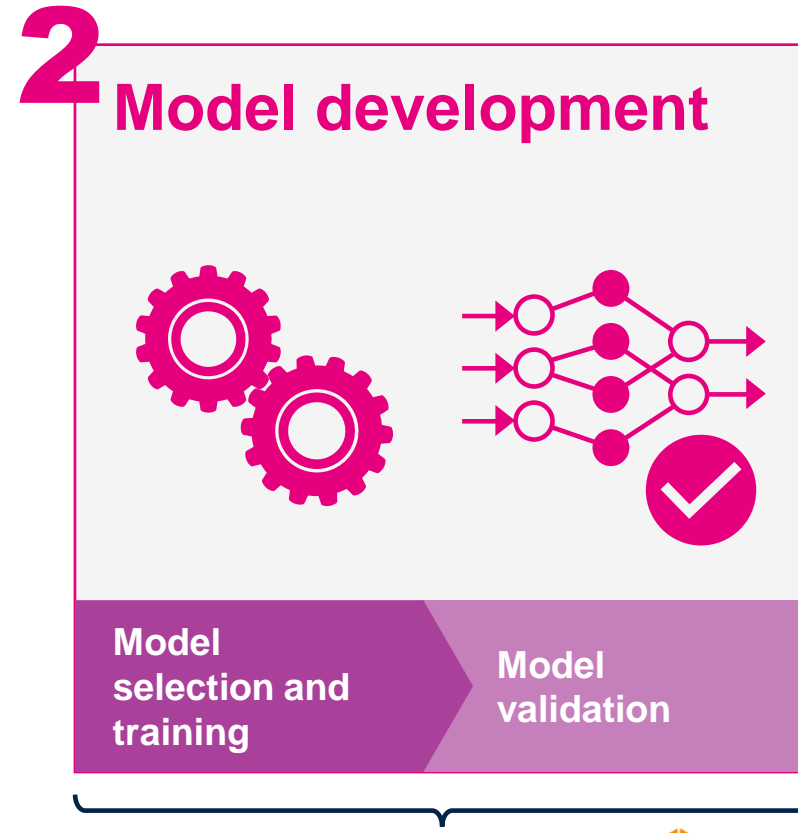


AutoML

AI development workflow – STM32Cube.AI



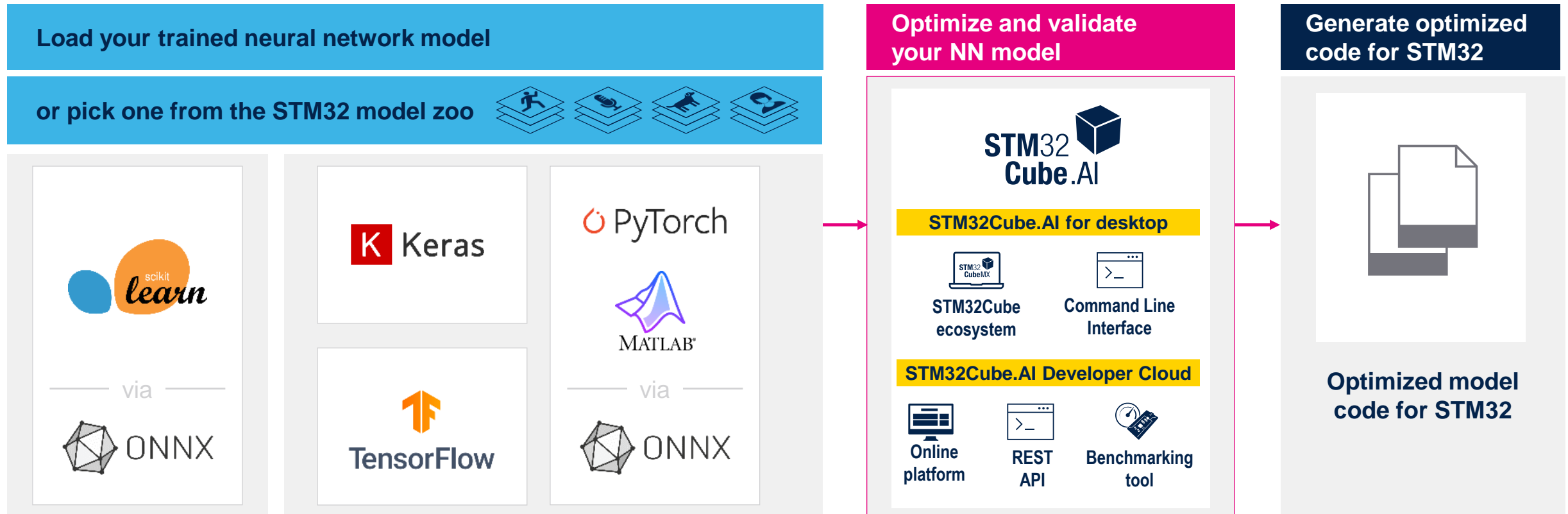
Data logging and curation tools



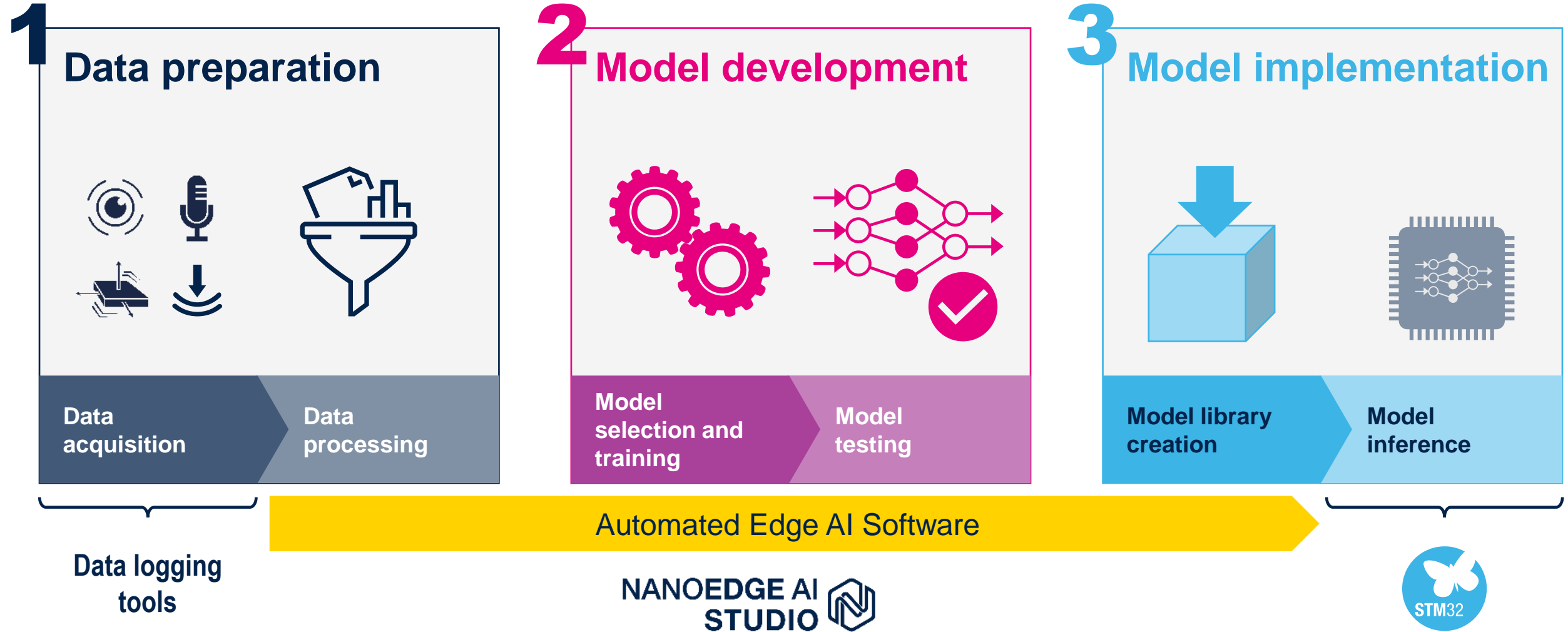
Edge AI toolkit



One tool – two versions to deploy AI on STM32



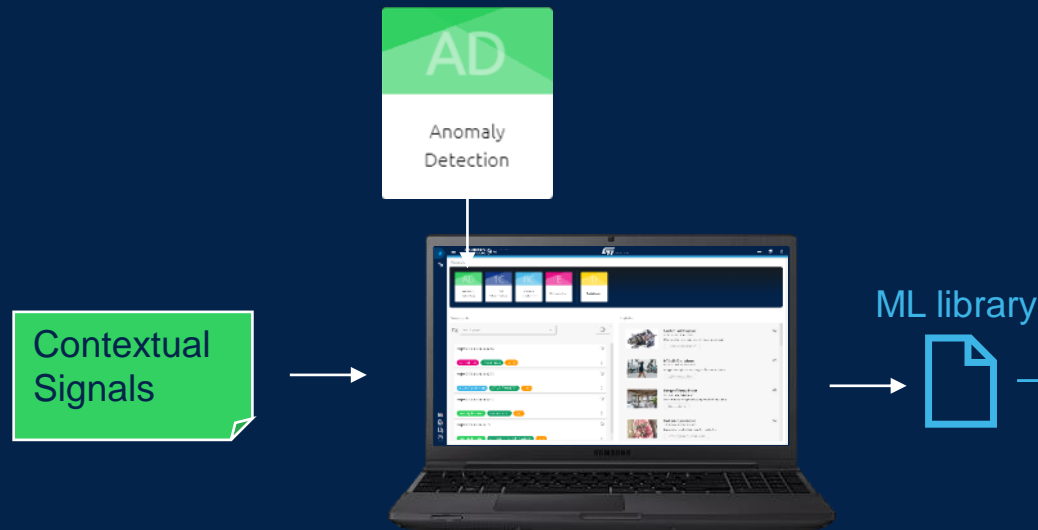
AI development workflow – NanoEdgeAI Studio



Learn in-situ what normality is

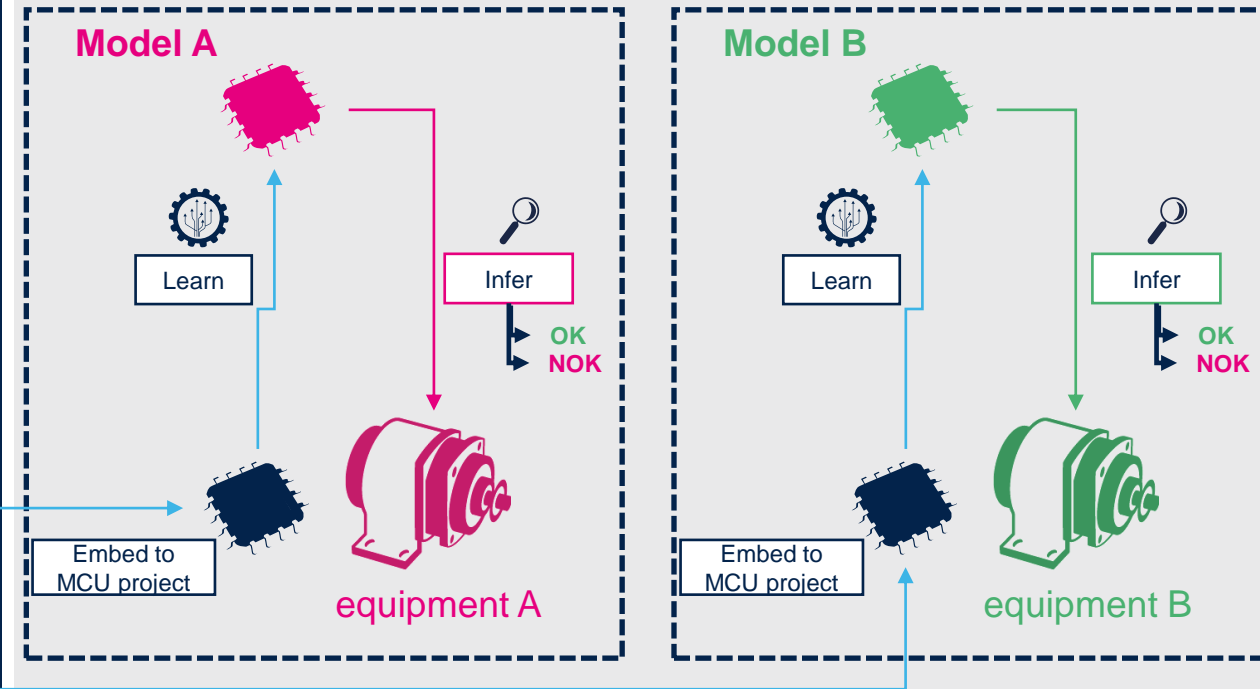
ON THE PC

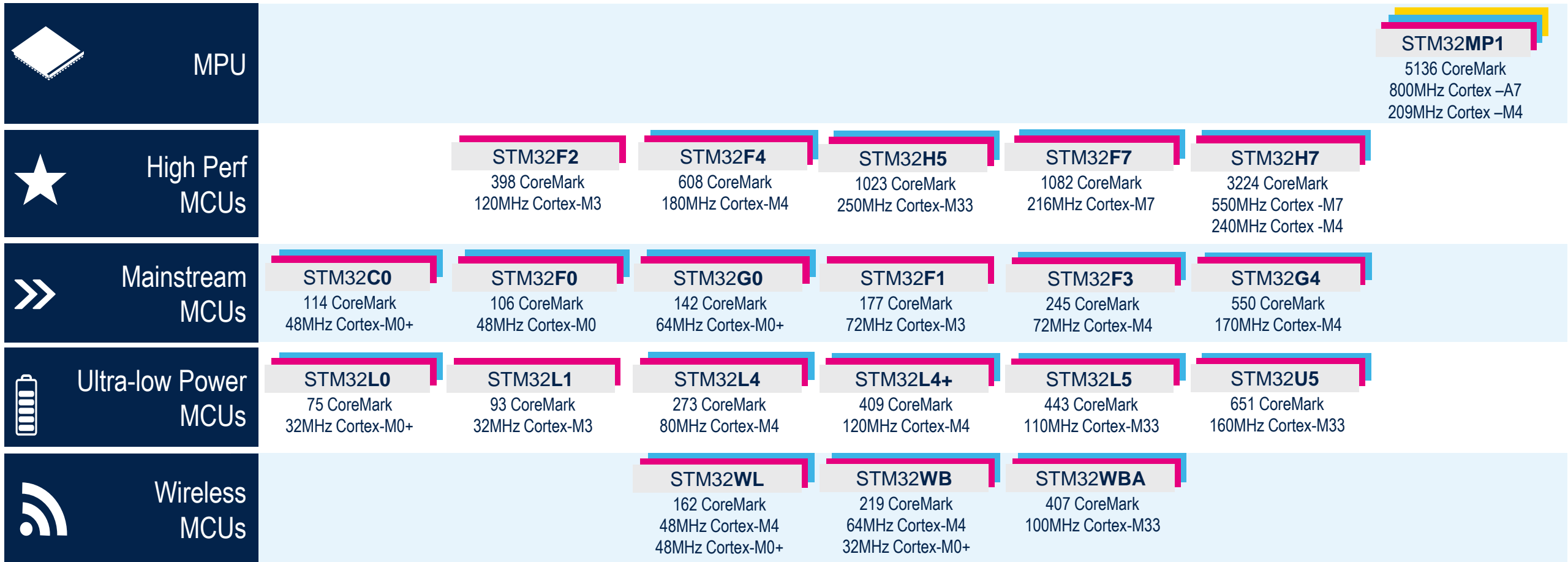
- 1 Creation of an **ANOMALY DETECTION** Machine Learning library



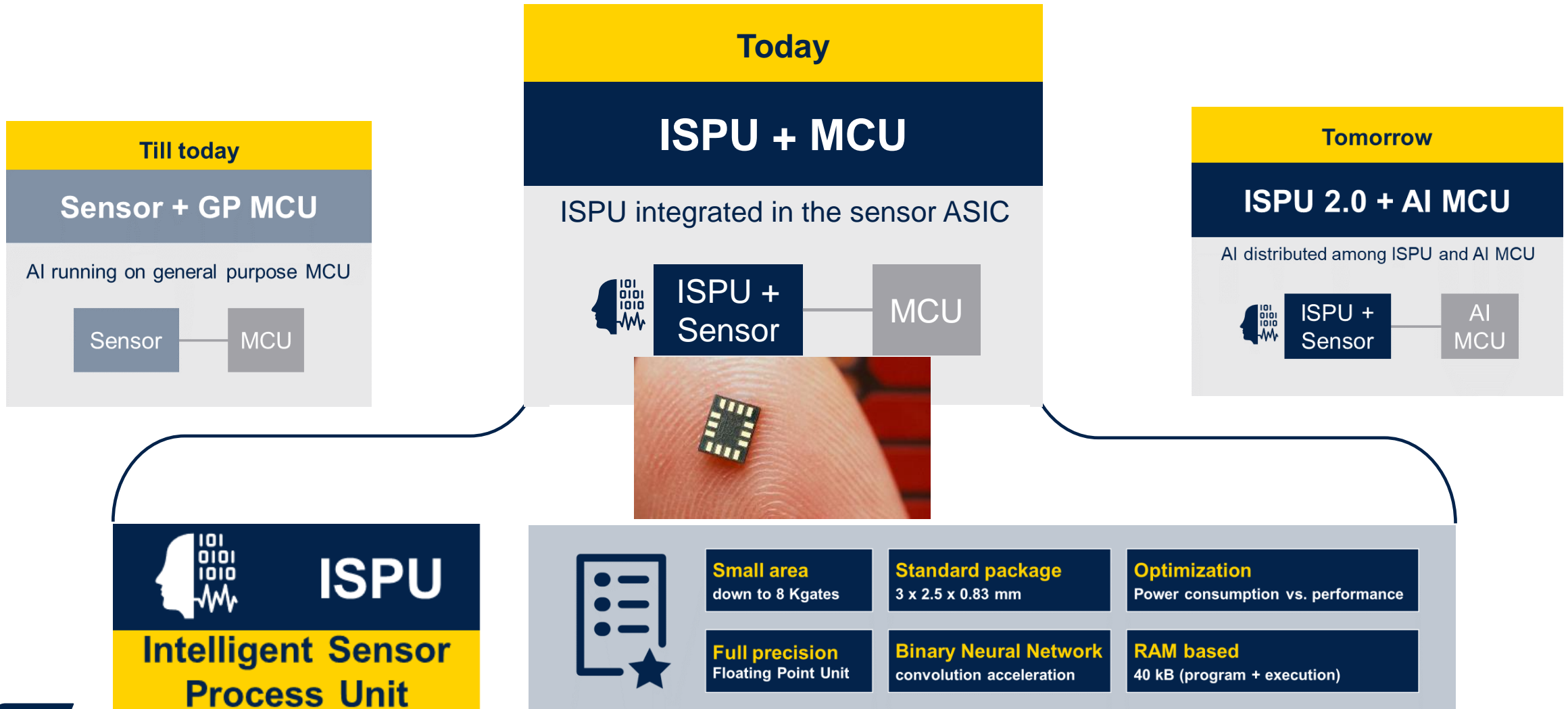
ON THE MCU

- 2 **On-target learning** for a fine-tuned model





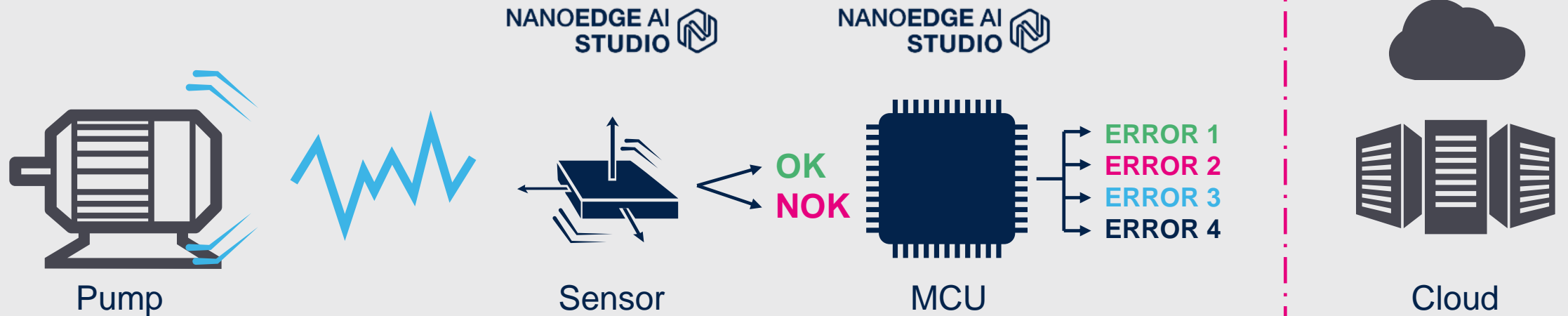
Evolution of system-based AI



NanoEdge AI running on sensors one step closer to the signal

Possibility to distribute the tasks between the sensor and the MCU

Far edge



Integrate your ML models more easily with our application-oriented code examples

Time series-based monitoring



FP-AI-MONITOR1

- Predictive maintenance and much more sensor-monitoring apps
- Runs Libraries from NanoEdge AI Studio

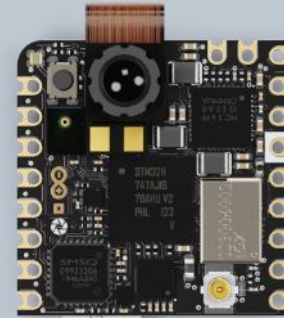
Audio and sensing



FP-AI-SENSING1

- Human activity recognition
- Acoustic scene classification
- Data logging, labeling, and result on Bluetooth® Low Energy applications

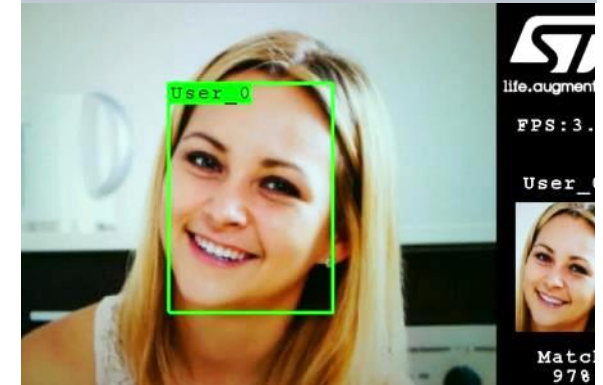
Computer vision



FP-AI-VISION1

- Food recognition (CNN)
- Person presence detection (CNN)
- People counting (object detection NN)
- Image processing library

Face recognition



FP-AI-FACEREC1

- Face detection and recognition
- Fully functional without cloud connection

A proven technology already adopted by multiple clients



INDUSTRIAL | DEMO

Fan anomaly detection based on vibrations

Learn to detect abnormal behavior at the edge on a vibrating machine.



INDUSTRIAL | CUSTOMER

AI solution for industrial predictive maintenance with NKE Watteco

Predictive maintenance solution for industrial equipment.



TRANSPORTATION | CUSTOMER

AI solution for monitoring automatic doors with Crouzet

Predictive maintenance on motors for automatic door motors.



INDUSTRIAL | DEMO

Anomaly detection in an electric motor

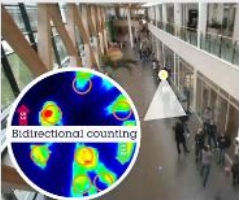
Current sensing to detect abnormal behaviors in motors.



INDUSTRIAL | CUSTOMER

AI solution for industrial predictive maintenance with Oxytronic

Predictive maintenance solution for industrial equipment.



SMART OFFICE | CUSTOMER

People flow counting Sensor with Schneider Electric

An innovative approach to measure people flows using an in-house thermal sensor.



SMART CITY | DEMO

Acoustic scene classification

Identify different environments (indoor, outdoor, in-car) using a simple microphone.



WEARABLES | DEMO

Human Activity Recognition

Easily identify 5 different activities with a 3D accelerometer.



INDUSTRIAL | DEMO

People presence detection (visual wake word)

Human detection on high-performance MCU.



INDUSTRIAL | DEMO

Aftermarket wireless digit reader

Equip meters with aftermarket wireless & low-power readers.



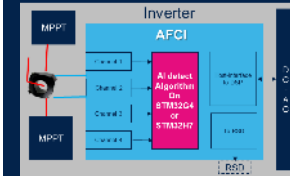
Reference designs developed at AI CC



Material
recognition
based on ToF



Face detection for
thermal camera



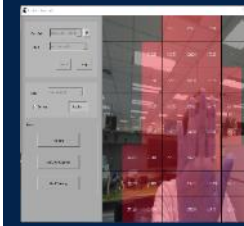
Solar Arc Fault
detection



WM clothes weight
estimation



(*) WM drum
anti collision
system



3D ToF Gesture
recognition



(*) Industrial radar
people detection



Water meter
digit recognition

**And more available or
under development...**

Our technology starts with You

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