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# STMicroelectronics

## DIGIFED Project: IoT bootcamp

November 2020

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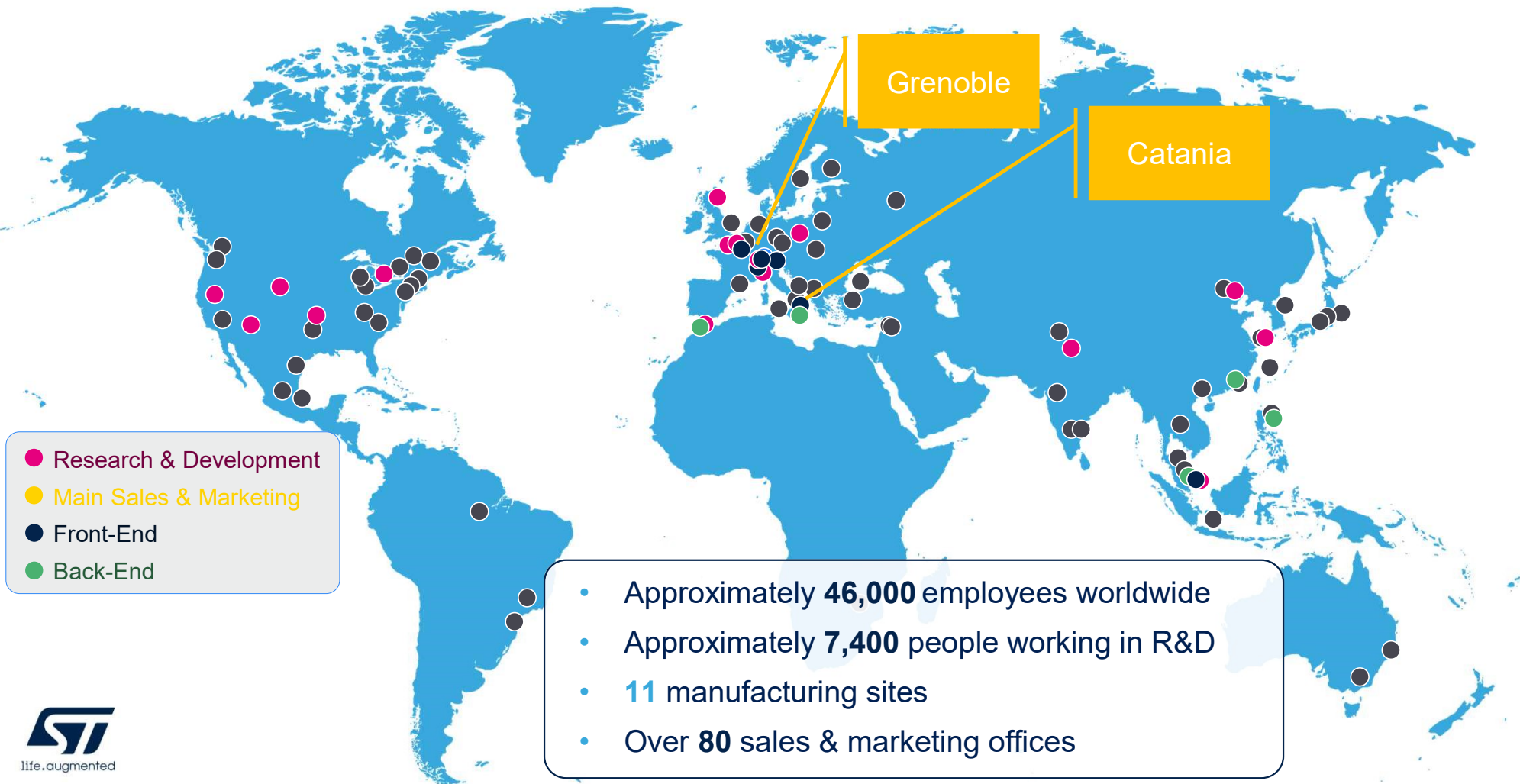
DigiFed

# STMicroelectronics

- Among the world's largest semiconductor companies
- Serving over **100,000** customers across the globe
- 2019 revenues of **\$9.56B**



# Global Presence

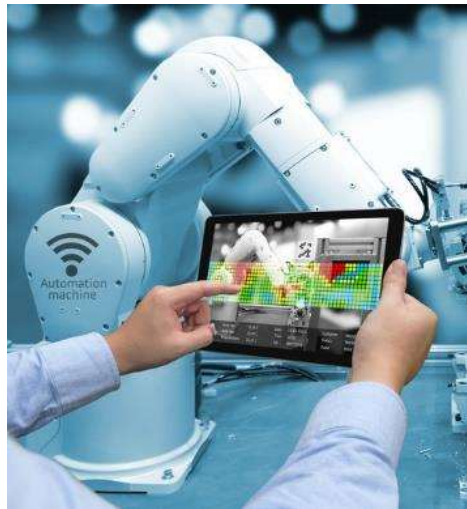


# Where You Find Us



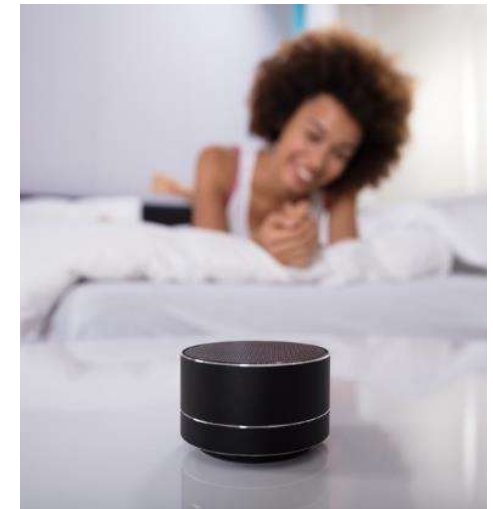
Making **driving** safer,  
greener and more  
connected

Enabling the evolution of  
**industry** towards  
smarter, safer and more  
efficient factories and  
workplaces



Making **homes & cities**  
smarter, for better living,  
higher security, and to  
get more from available  
resources

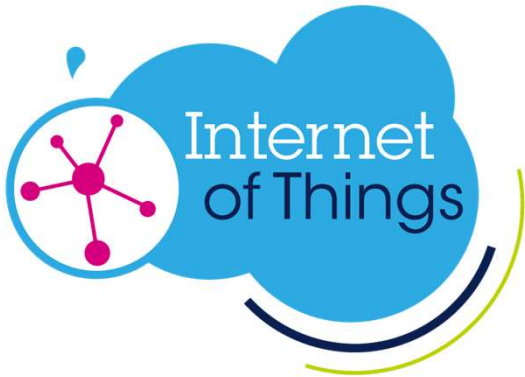
Making everyday **things**  
smarter, connected and  
more aware of their  
surroundings





# IoT Strategic Focus

IoT is a movement where any system is able to leverage the Internet and its eco-system



Smart Industry



Smart City



Smart Home

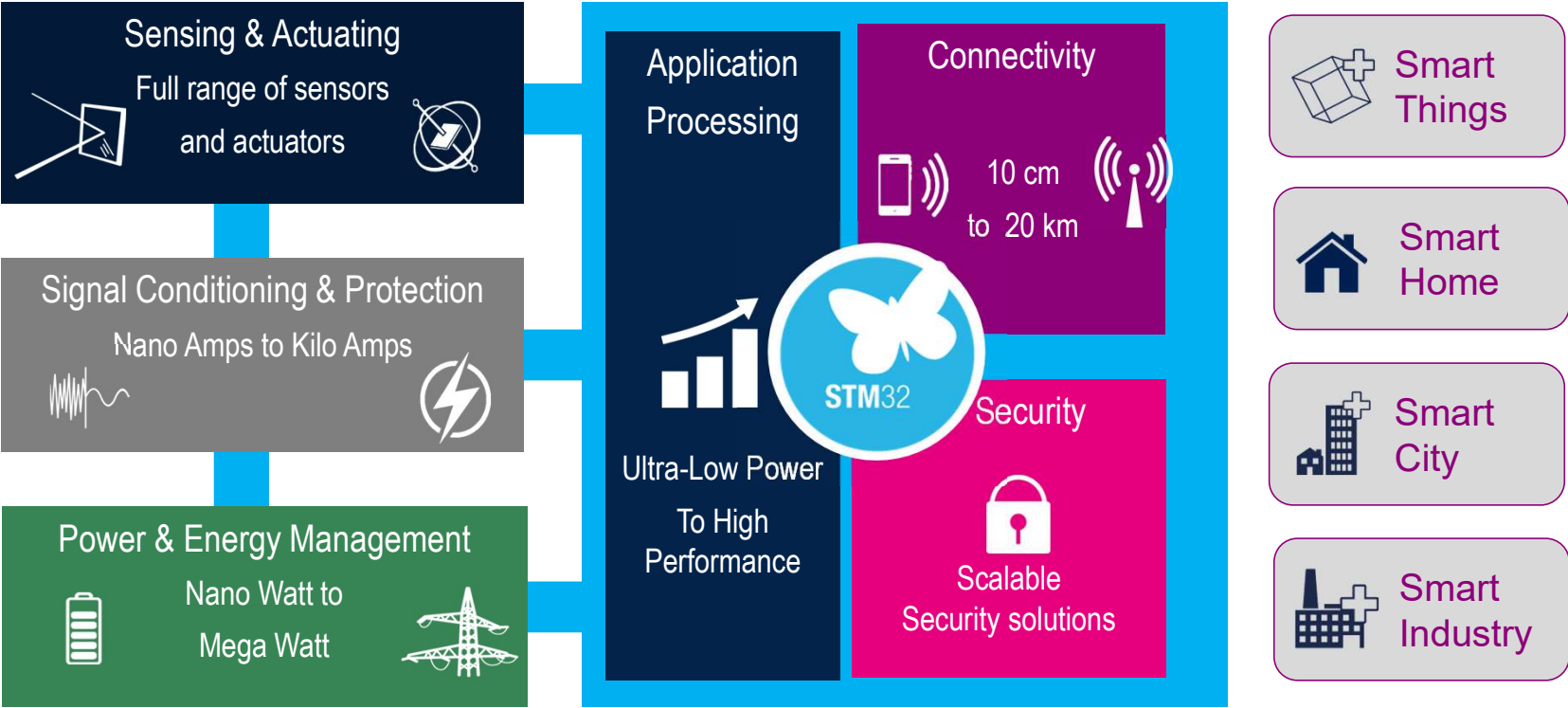


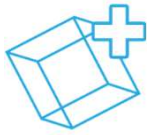
Smart Things



The leading provider of products and solutions for the Internet of Things

# Everything for the Internet of Things





Smart Things

# Smart Things

Making Everything Smarter



## A Smart Thing ...

- Understands the environment
- Manages data and transforms it into information
- Connects to the world
- Protects your data
- Is energy efficient



Smart Industry

# Smart Industry

Enabling smarter, safer and more efficient factories and workplaces



## Smart Industry

- **Factories that produce in a more efficient manner**
- **More flexibility and customization possibilities in the supply chain**
- **More sustainable production with less waste and less energy used**
- **Safer working environments for people**
- **Better man-machine cooperation in the work place**
- **Optimized usage of machines and tools**





Smart Home & City

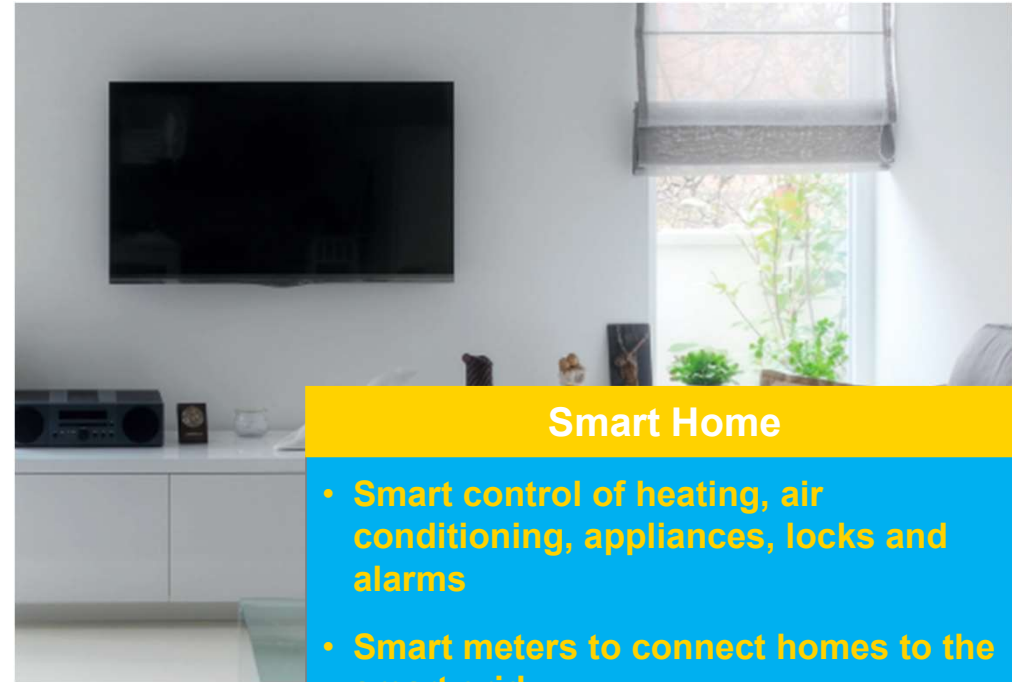
# Smart Home & City

Making Home & Cities Smarter



## Smart City

- Smart city infrastructure to improve traffic and municipal services
- Smart Grid
- Intelligent, adaptive street lighting
- Smart Buildings



## Smart Home

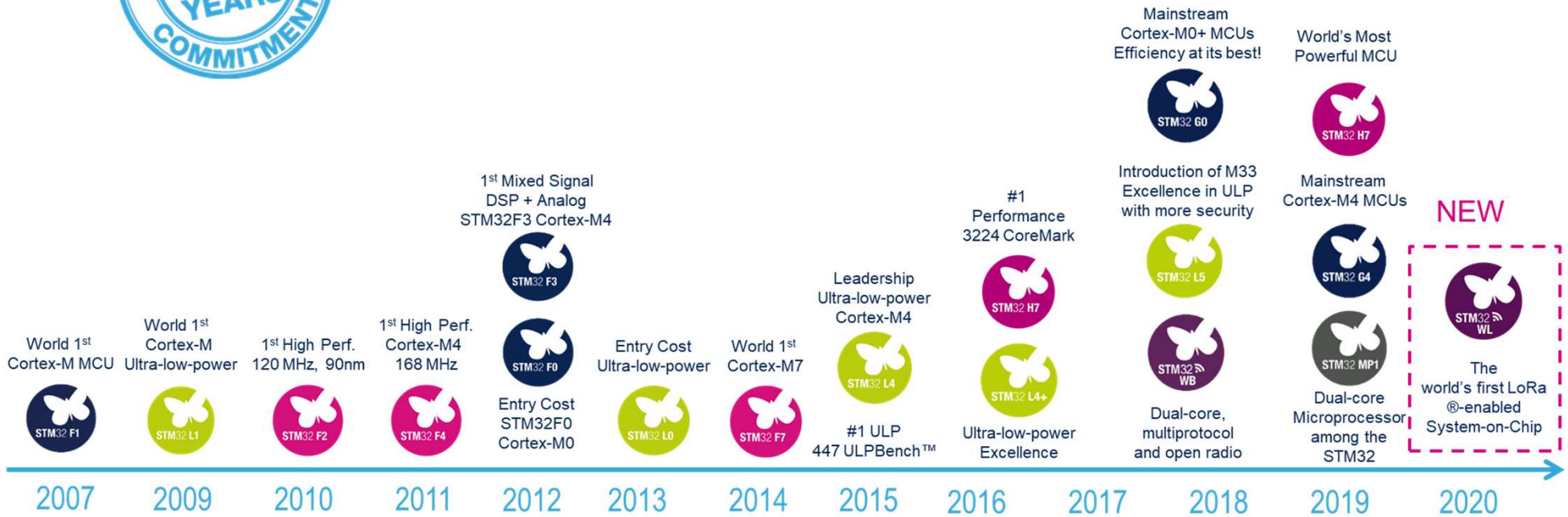
- Smart control of heating, air conditioning, appliances, locks and alarms
- Smart meters to connect homes to the smart grid
- More energy efficiency, convenience, comfort and security



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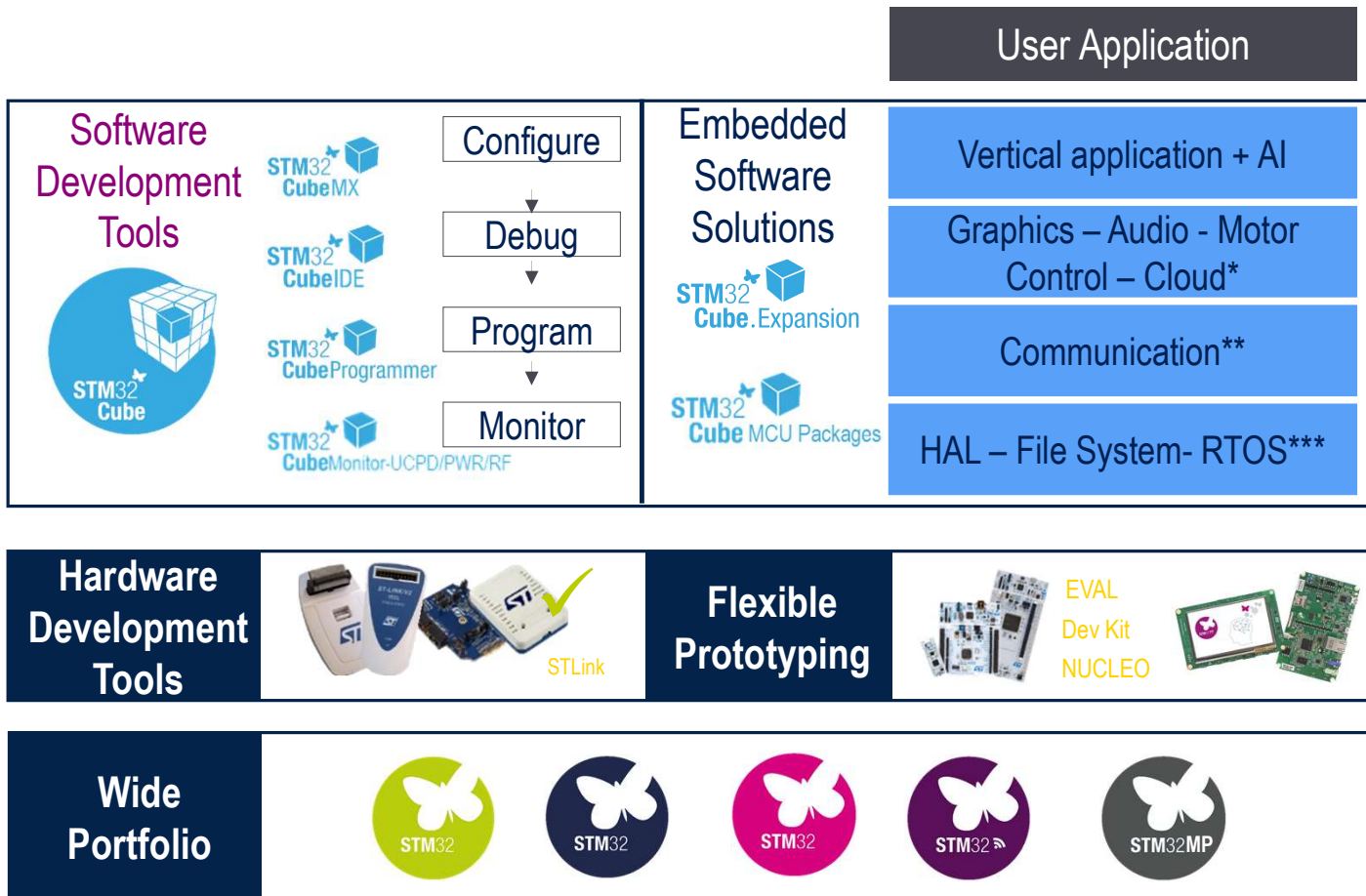
# STM France: STM32 MCU & MPU

# The STM32 Success Story



# State-of-the-Art STM32 Ecosystem

## Key Criteria for MCU/MPU Choice by OEMs



**\***

**\*\***

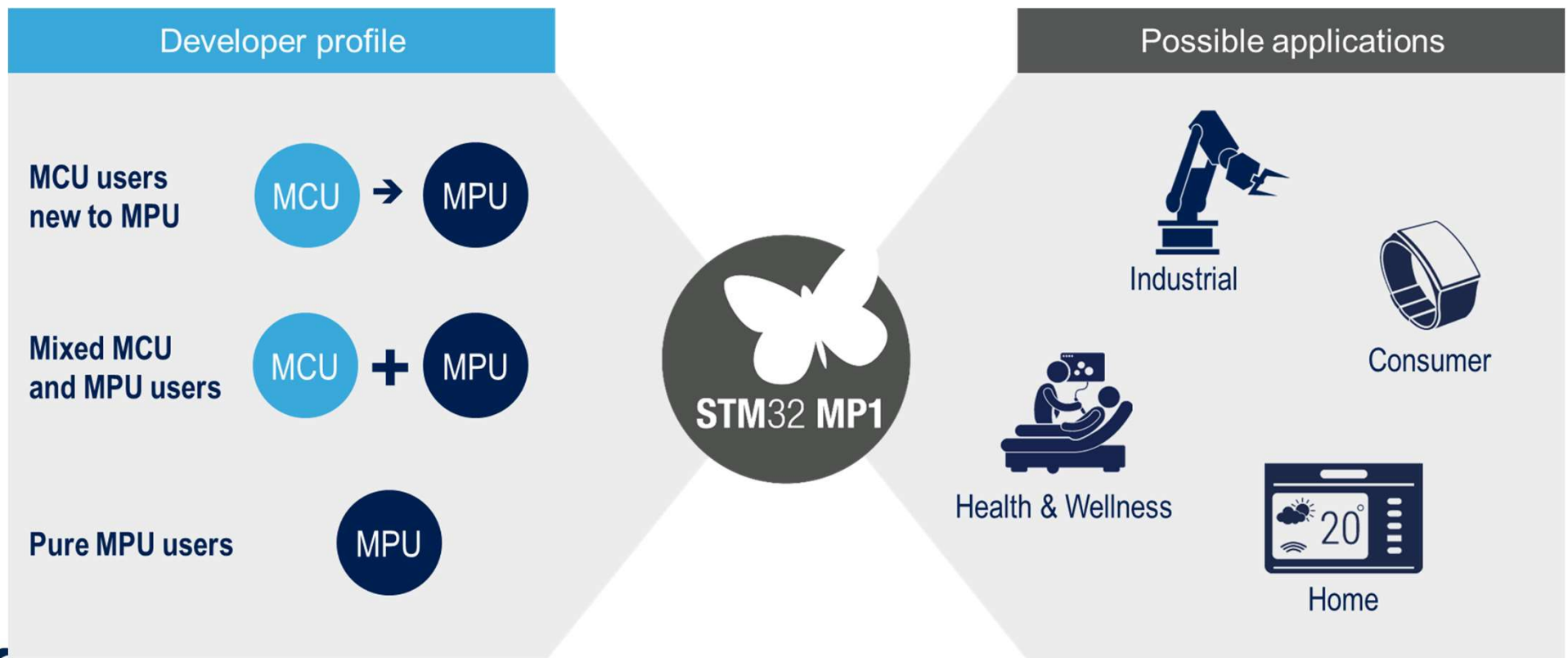
**\*\*\***

 OpenSTLinux Distribution	Complete offer Partner Open Source & Framework
----------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------



# STM32MP1: a General Purpose MPU

## Suitable for all Developer Types and Multiple Applications





# A Fully Integrated Design Suite Leveraging the STM32Cube Environment



**STM32MP1 Embedded Software Distribution**

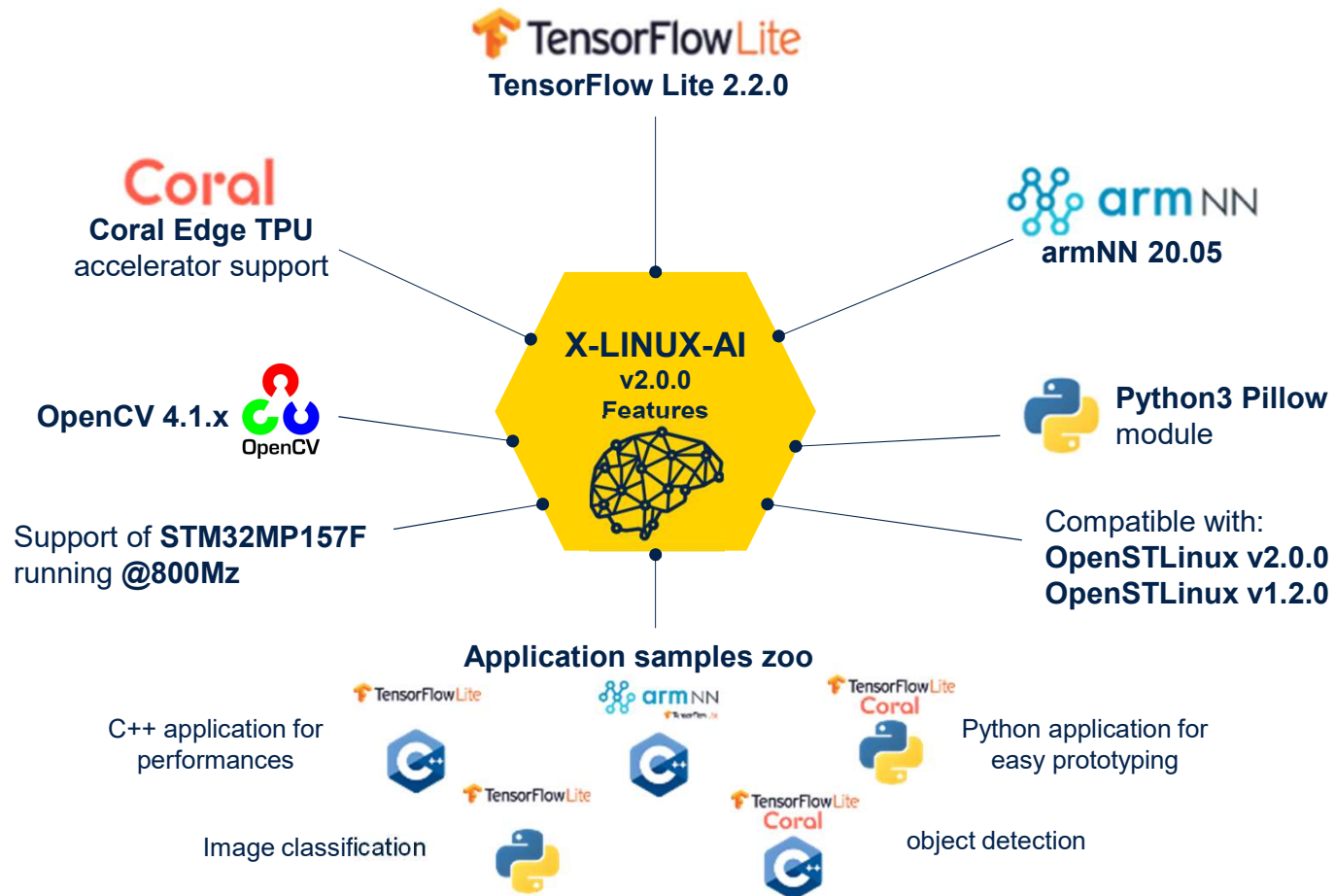
# X-LINUX-AI Expansion Package





# X-LINUX-AI v2.0.0

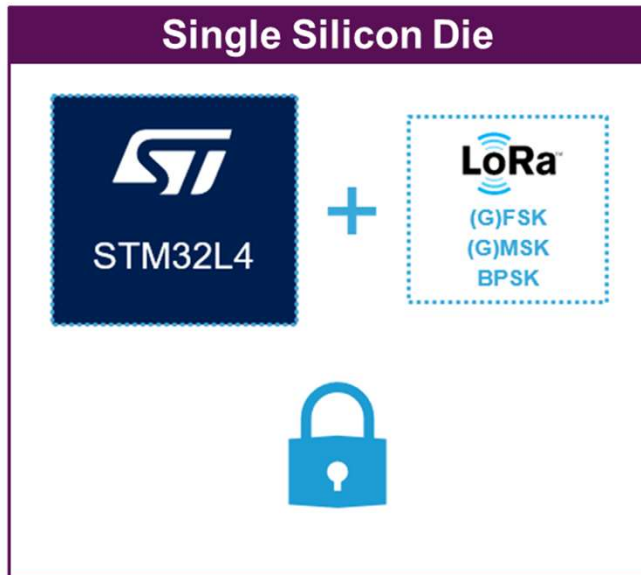
released beg of July 2020





# System-on-Chip Made for Versatility

A Long-Range Wireless Microcontroller: one die, many IoT possibilities



=



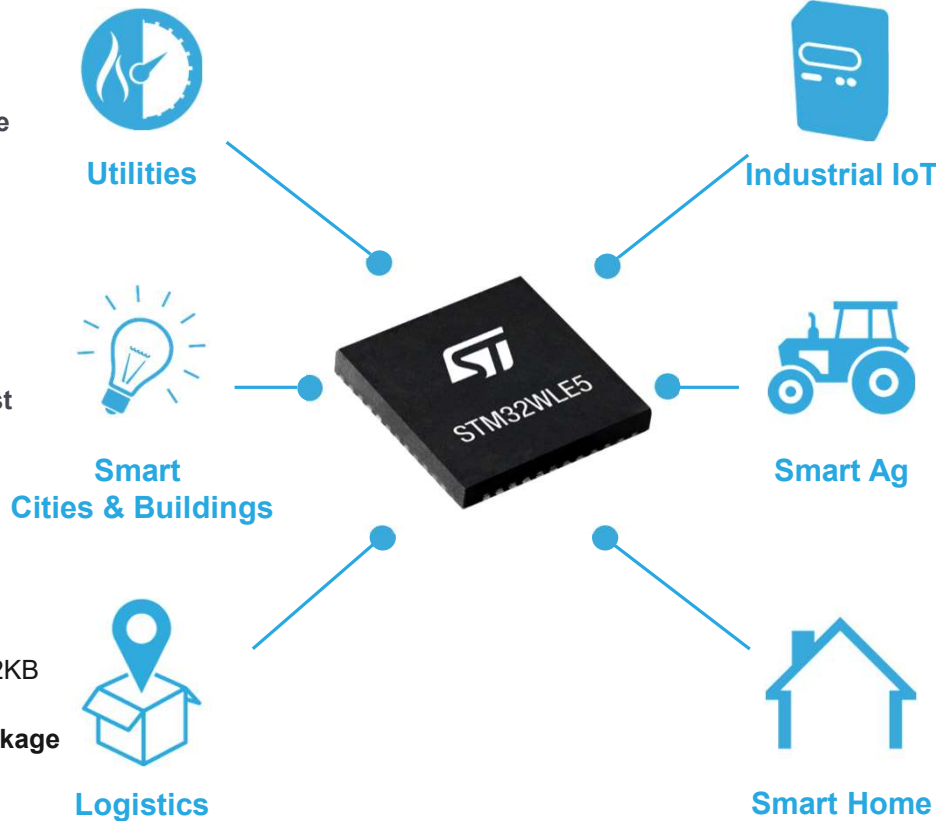
**World  
First**

# Best Suited for Many LPWAN Market

- Worldwide compatibility **150 MHz to 960 MHz** Linear Range
- Multi-protocol capable
- ST Longevity commitment: **10 years life time**

- Up to +22 dBm output power for wide coverage
- **-148 dBm** sensitivity with LoRa: **Robust RF Link**
- **Reduced BOM cost**

- **Unique-IDs** for enhanced traceability
- Down to 390 nA mode with RTC and 32KB of RAM for extended Battery lifetime
- Small form factor with **UFBGA 5x5 package**



- Up to **105 °C** MCU capable
- **Only 5 µs wakeup time** for best latencies
- Only 5.4 mA as LoRa RX consumption for battery optimization

- Link Budget > **160 dB** = Very long ranges
- Excellent battery lifetime: Only 15 mA for LoRa TX consumption @ 10 dBm
- **PCROP, ECC, TRNG, PKA**, for best design robustness

- Down to 71 µA/MHz in Run mode for efficient action
- < 1 µA Stop mode with full RAM for **battery life** optimization
- 12-bit ADC & DAC for mixed applicative use cases

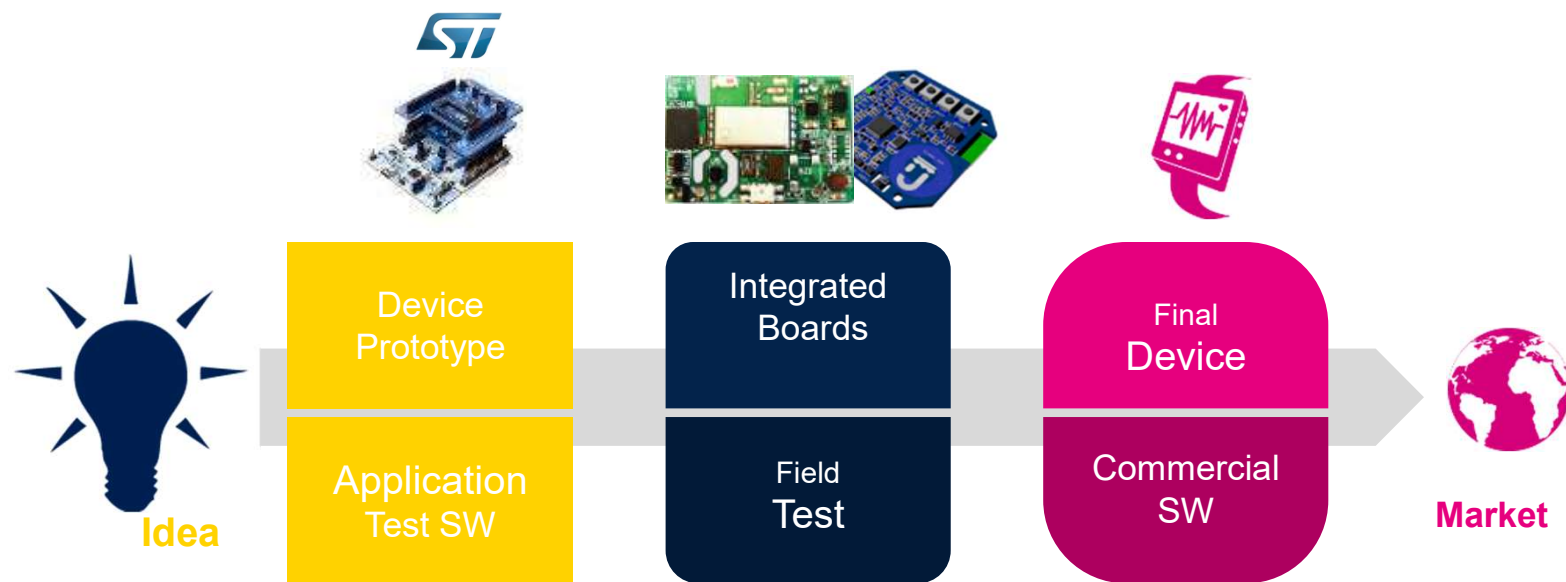


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# STM Italy: STM32 Open Development Environment

# STM32 Open Development Environment

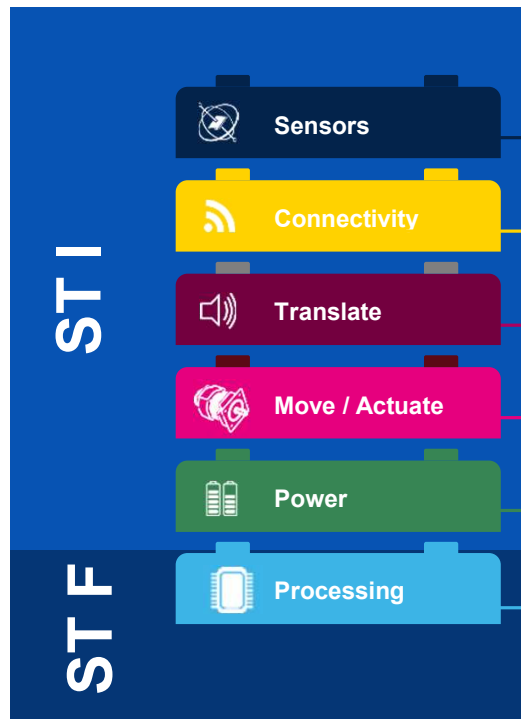
Fast, affordable prototyping with development continuity to final device





# STM32 Open Development Environment

Your need      The building blocks      Our answer



Application Software and Development tools

25 Processor Boards (Nucleo 64)  
43 Expansion Boards (X-Nucleo)

- Motion & Environ. Sensors
- Bluetooth Low Energy
- Sub-GHZ
- NFC
- Microphone
- Motor control
- Microcontroller

Integrated Development Environment and Middleware

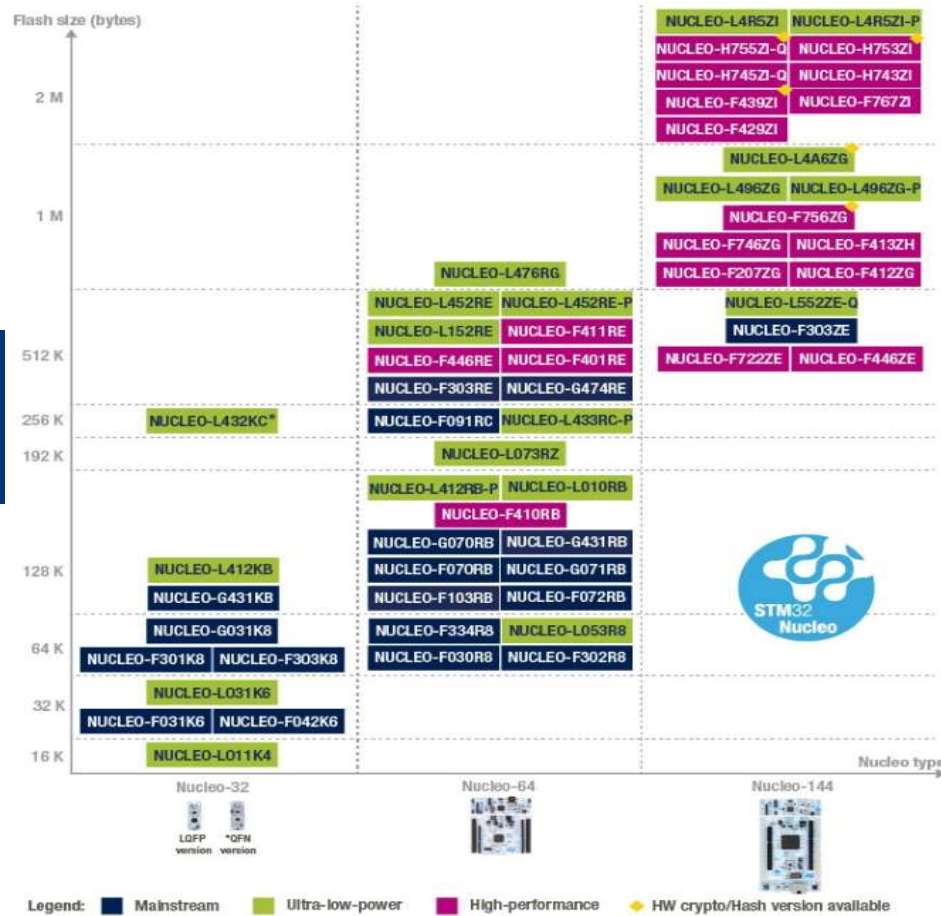


Function Packs (FP)



# STM32 Nucleo Boards accros STM32 Microcontroller families

STF  Processing



# X-Nucleo Boards

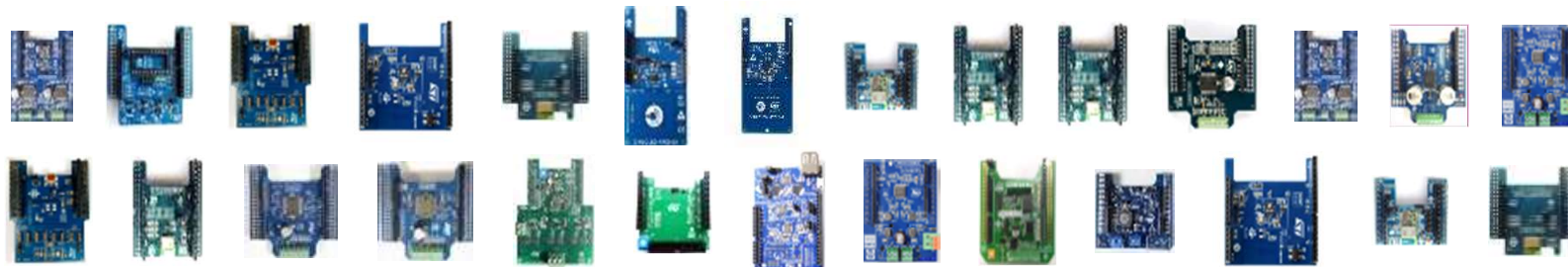
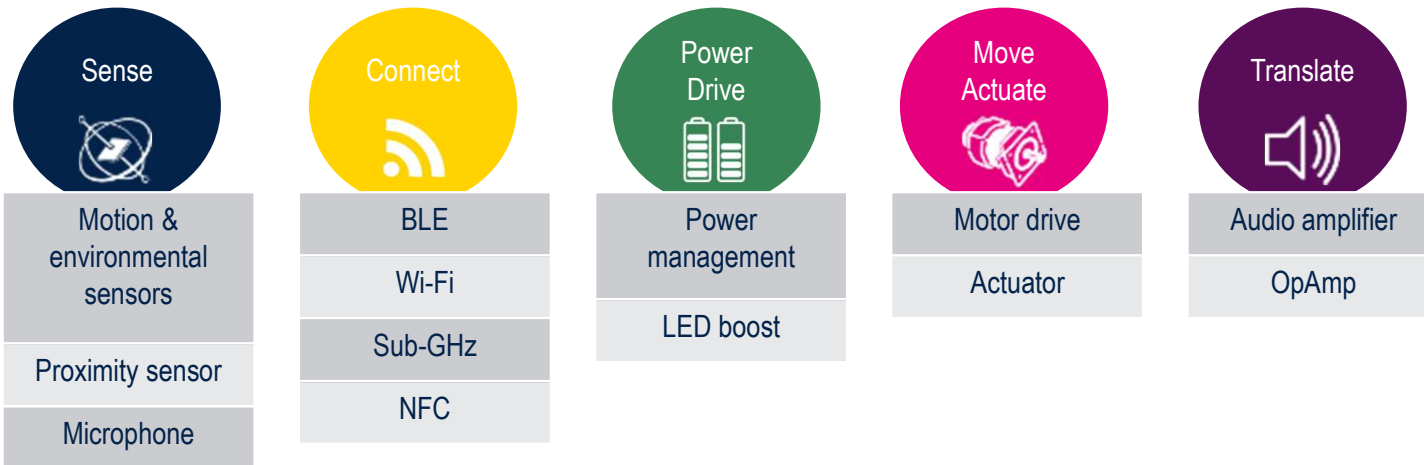
STMicroelectronics Italy provides access to X-Nucleo to work in synergy with the STM32 environment to create the functionality required for the fast prototyping of advanced systems solution on smart industry, IoT, smart farm, motor control, Smart sensing (inertial, environmental, proximity, etc) addressing the STM32 Open Development Environment by means of STM32Cube expansion software provided free for use with the STM32 Nucleo expansion board and fully compatible with the STM32Cube software framework.

It provides abstracted access to expansion board functionality through high-level APIs and sample applications.

The X-Nucleo boards have been organized under five key functions, Sense, Connect, Power Drive, Move& Actuate and Translate,

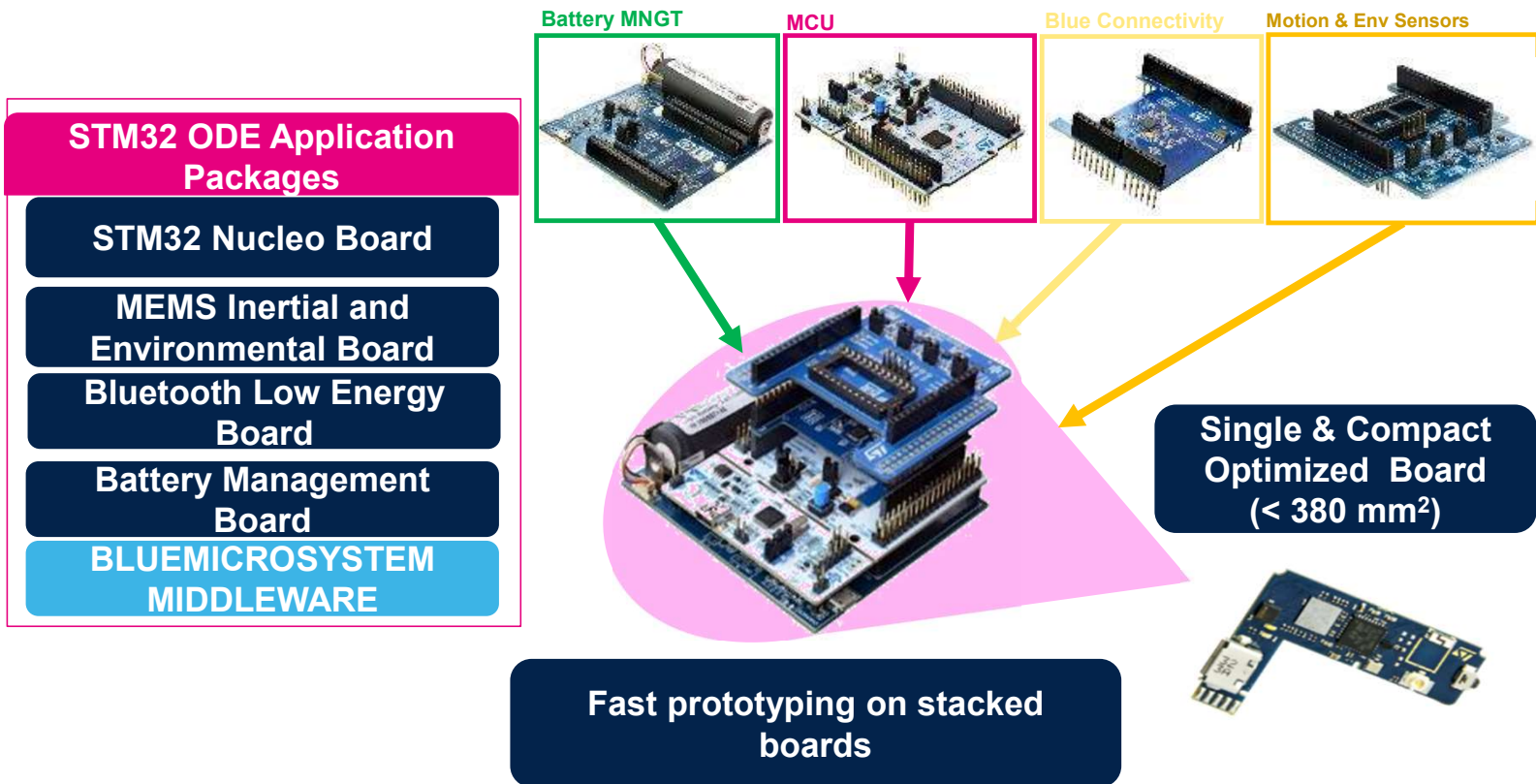
# X-NUCLEO™ family overview

43 expansion boards covering all the key functions





# ST based Fast Prototyping



# STEVAl examples

## SensorTile development kit



- 13x13 mm solderable module and connectable module
- SensorTile expansion Cradle board equipped with audio DAC, USB port
- SensorTile Cradle with battery charger, humidity and temperature sensor, SD memory card slot and USB port
- 100 mAh Li-Ion battery, UN38.3 tested and certified
- SWD programming cable, Fully tested and certified by FCC, IC, Japan

## BlueCoin Development Kit

- BlueCoin module with STM32, Motion Sensors, Microphones and Bluetooth LE Connectivity
- Coin Station board equipped with Time-of-Flight sensor and Power Management stage
- BlueCoin Cradle with SD memory card slot, USB port and battery connector
- 130 mAh Li-Po battery, UN38.3 tested and certified
- Fully tested and certified by FCC, IC



## Geo IoT Tracker

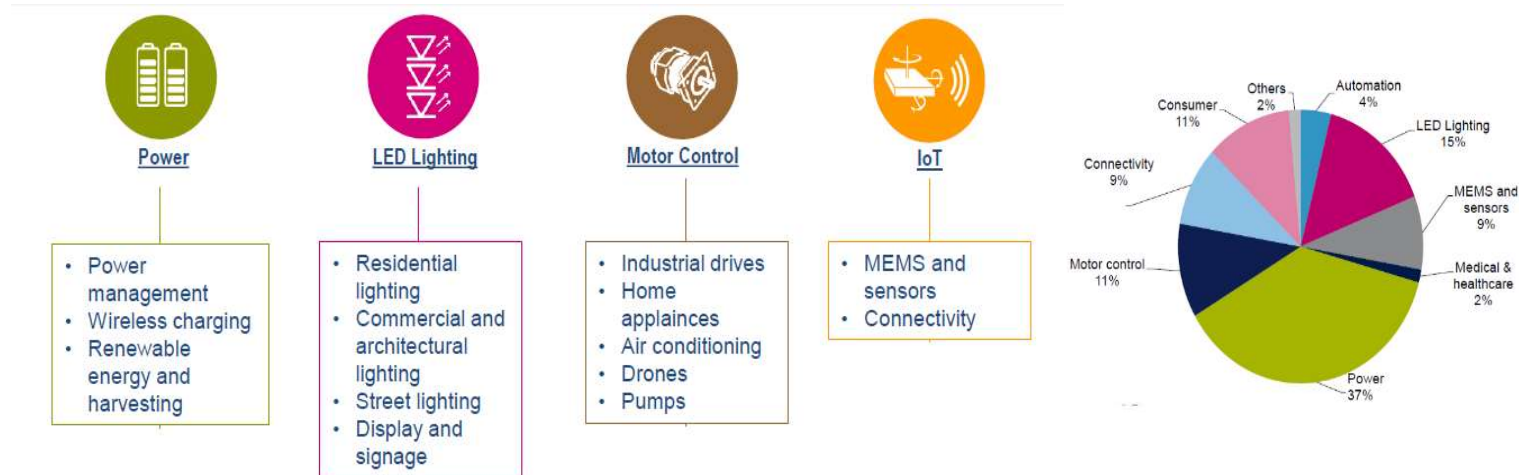


- Optimized tracker solution over LoRaWAN network with simultaneous multiconstellation
- GNSS positioning and Geofencing support
- Battery operated solution with smart power management architecture
- Environmental and motion sensors
- Data Logging
- High flexibility to cover different application profiles (pet-tracker, asset monitoring, ...)

# STEVAl Boards

The evaluation boards help to evaluate the features and performance of selected products, all of them have been published online fully tested schematics, BOMs, and Gerber files to facilitate the next hardware design and where appropriate, also firmware or demonstration software packages available as well.

STEVAl boards have be organized in four focus areas, Power, Led Lighting, Motor Control, IoT;



# Thank you

*Everywhere microelectronics make a positive contribution to people's lives, ST is there*

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