Prototyping applications in the IoT Era
D&E event 2024 Presentation

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product manager, TME

Hardware   Software   Test & Measurement   Engineering   Research & Development

Agenda

- **Company's introduction**

- **Designig Automation/Embedded Systems – skills, toolchain**

- **Arduino's PRO Open Architecture Platform – what does it offer ?**

- **Arduino's PRO – how to get started**

- **Arduino's PRO – summary**

- **Q/A session**

About us

Transfer Multisort Elektronik Sp. z o.o. is a family business established in 1990 in Łódź (Poland) as a small shop for electronic components.

Currently, TME is one of the most dynamically developing distributors of electronic components in the world.

We are more than happy to cooperate with you

Where we are

SUBSIDIARIES
WE ARE ACTIVE IN OVER 150 COUNTRIES

TME US, LLC.
Atlanta, United States

Shenzhen TME Electronic Trading Company Ltd.
Shenzhen, China

EUROPA

USA

CHINA

GB NL PL
DE SK
CZ RO
HU
ES

HEADQUARTERS

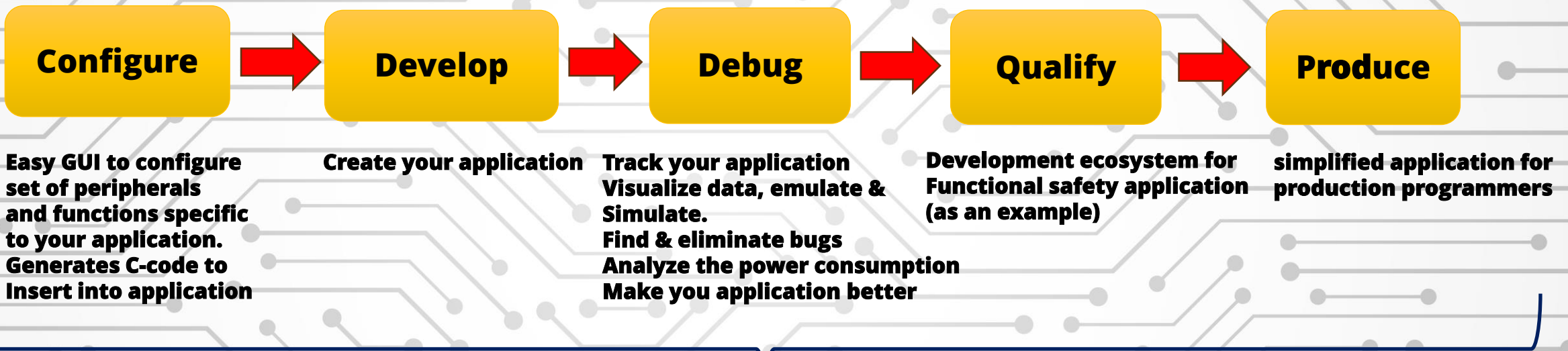|			
Transfer Multisort Elektronik Sp. z o.o. Łódź, Poland	**TME Czech Republic, s.r.o.** Ostrava, Czech Republic	**TME Slovakia, s.r.o.** Žilina, Slovakia	**TME Hungary Kft.** Budapest, Hungary
Transfer Multisort Elektronik S.R.L. Timişoara, Romania	**TME Germany GmbH** Leipzig, Germany	**Transfer Multisort Elektronik S.L.U.** Coslada, Madrid, Spain	
Transfer Multisort Elektronik B.V. Eindhoven, Netherlands	**TME ITALIA S.r.l.** Grassobbio, Bergamo, Italy	**Transfer Multisort Elektronik Ltd.** Coleshill, Birmingham, United Kingdom	

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Het ontwerpen van innovatieve elektronica
Woensdag 20 maart 2024
1931 Congrescentrum 's-Hertogenbosch

Designing Automation & Embedded System Desired skills in IoT Era

➢ Education & up to date technical knowledge of modern technologies & design methods

➢ Ability to use many types of products in project to achieve:

  ➢ Efficiency

  ➢ Security

  ➢ Robustness

  ➢ Minimum Energy consumption

➢ Programming skills

➢ Commitment to quality and product testing

➢ Analytical thinking and problem solving skills

➢ Communication & cooperation skills

➢ Adaptation to customer needs

➢ Awareness of Trends and Innovation

And on top of that – requirement to create new solutions fast to make Time To Market short !

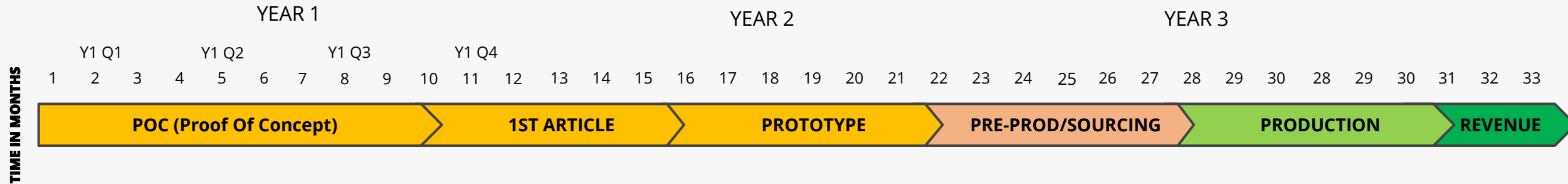# Designing Automation & Embedded System Knowledge of the toolchain

Configure → **Develop** → **Debug** → **Qualify** → **Produce**

Configure
Easy GUI to configure set of peripherals and functions specific to your application. Generates C-code to Insert into application

Develop
Create your application

Debug
Track your application Visualize data, emulate & Simulate.
Find & eliminate bugs
Analyze the power consumption
Make you application better

Qualify
Development ecosystem for Functional safety application (as an example)

Produce
simplified application for production programmers

IDE

Typically process of mastering a toolchain takes about 2 years. Unfortunately each MCU/MPU manufacturer has it's specific toolchain. So mastering only one creates some kind of dependency

Designing Automation & Embedded System Chip-down design

CHIP-DOWN DESIGN

	YEAR 1								YEAR 2								YEAR 3							

Y1 Q1   Y1 Q2   Y1 Q3   Y1 Q4

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 28 | 29 | 30 | 31 | 32 | 33 |

TIME IN MONTHS

POC (Proof Of Concept) | 1ST ARTICLE | PROTOTYPE | PRE-PROD/SOURCING | PRODUCTION | REVENUE

Question:

What can be done to make design process easier, faster, safer & accessible for bigger numer of engineers & developers ?

Answer:

Introduce a reliable Enterprise Platform !!!

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Arduino's PRO all in one IoT platform

SOMs

Portenta C33
Cortex-M33

Portenta H7
Cortex-M7&M4

Portenta X8
Cortex-A53

SMART SENSORS
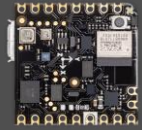
Nicla Sense ME
Cortex-M7&M4

Nicla Vision
Cortex-M7&M4

Nicla Voice
Cortex-M7&M4
Cortex-M0 (NDP)

INDUSTRIAL AUTOMATION

Opta PLC
Cortex-M7&M4
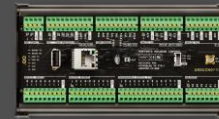
Portenta Machine Control
Cortex-M7&M4

CONNECTIVITY & ACCESSORIES

Max Carrier

Hat Carrier

Wisgate Edge

Edge Control

Vision Shield

GNSS Shield

SOFTWARE IDE

Arduino IDE

Arduino PLC IDE

CLOUD (Arduino Pro Cloud)

ARDUINO CLOUD · aws · Azure · software AG

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Arduino's PRO as Open Architecture platform
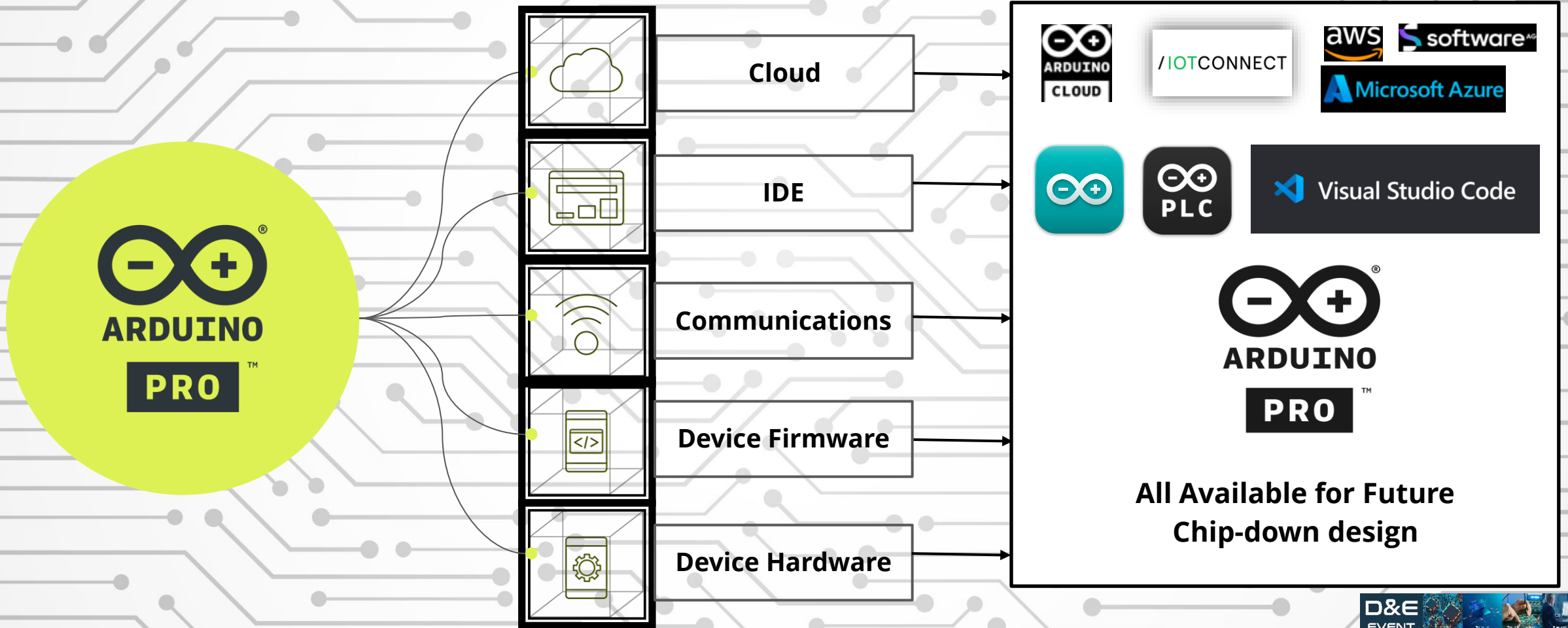
Arduino's unique prop: No vendor-lock-in & interoperability

Application

Cloud

Middleware

OS (RTOS)

Drivers (e.g. I2C)

Hardware

Arduino Code (Sketch)

Application Code

OS API

Security APIs

Hardware Interfaces & Drivers
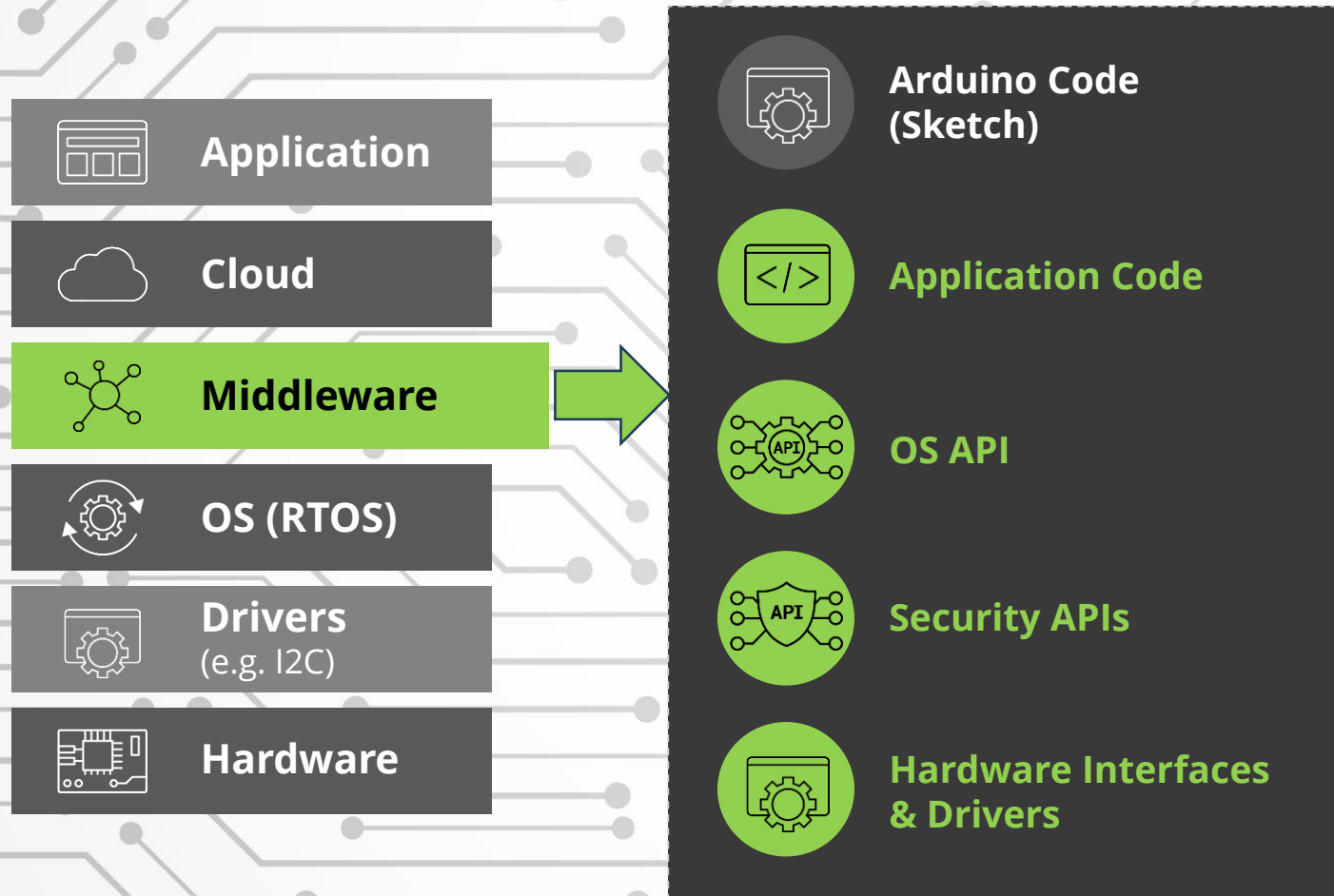
Arduino works with:

ST

NXP

RENESAS

Secret Sauce: Arduino handles this

Arduino IDE

Verify / Upload: compile and upload your code to your Arduino Board.

Select Board & Port: detected Arduino boards automatically show up here, along with the port number.

Sketchbook: here you will find all of your sketches locally stored on your computer. Additionally, you can sync with the Arduino Cloud, and also obtain your sketches from the online environment.

Boards Manager: browse through Arduino & third party packages that can be installed. For example, using a MKR WiFi 1010 board requires the *Arduino SAMD Boards* package installed.

Library Manager: browse through thousands of Arduino libraries, made by Arduino & its community.

Debugger: test and debug programs in real time.

Search: search for keywords in your code.

Open Serial Monitor: opens the Serial Monitor tool, as a new tab in the console.

Arduino PLC IDE

IEC 61131-3 Integration: Enables PLC engineers to use IEC 61131-3 programming languages within the Arduino environment.

Deterministic Tasks: Provides an intuitive programming experience for deterministic cyclic tasks and multitasking.

Fieldbus Support: Integrated no-code support for industrial fieldbuses like Modbus RTU, Modbus TCP, and CanOpen.

Function Blocks: Offers function blocks and libraries for a low-code programming approach.

Seamless Porting: Allows for the quick porting of existing PLC applications to Arduino hardware.

Debugging Tools: Comprehensive debugging tools including watch windows, breakpoints with step-by-step execution, triggers, oscilloscope, and live debug mode.

Unified Programming: Highly configurable UI provides a unified programming environment.

Efficiency: Enables seamless sharing of variables between PLC and Arduino sketch programming.

Arduino PLC IDE

Dedicated Resources

Shared Variables
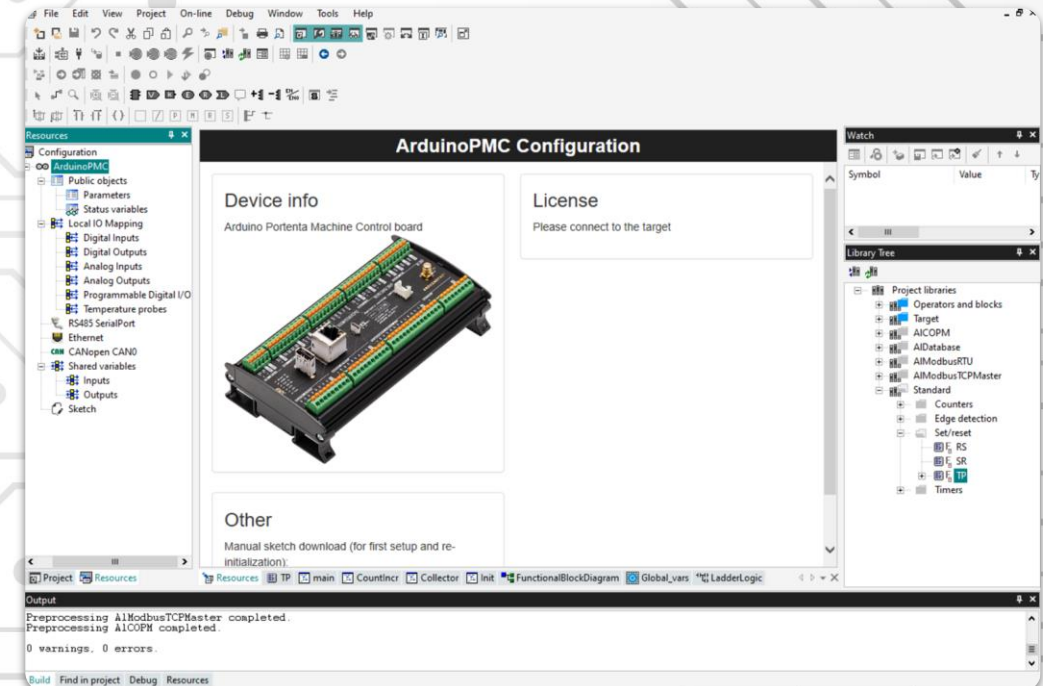
Project management tree

No Code Variables initialization, assignment, arrays declaration

Debugging and status runtime monitoring tools

Arduino PLC IDE talks to Arduino sketch & Cloud
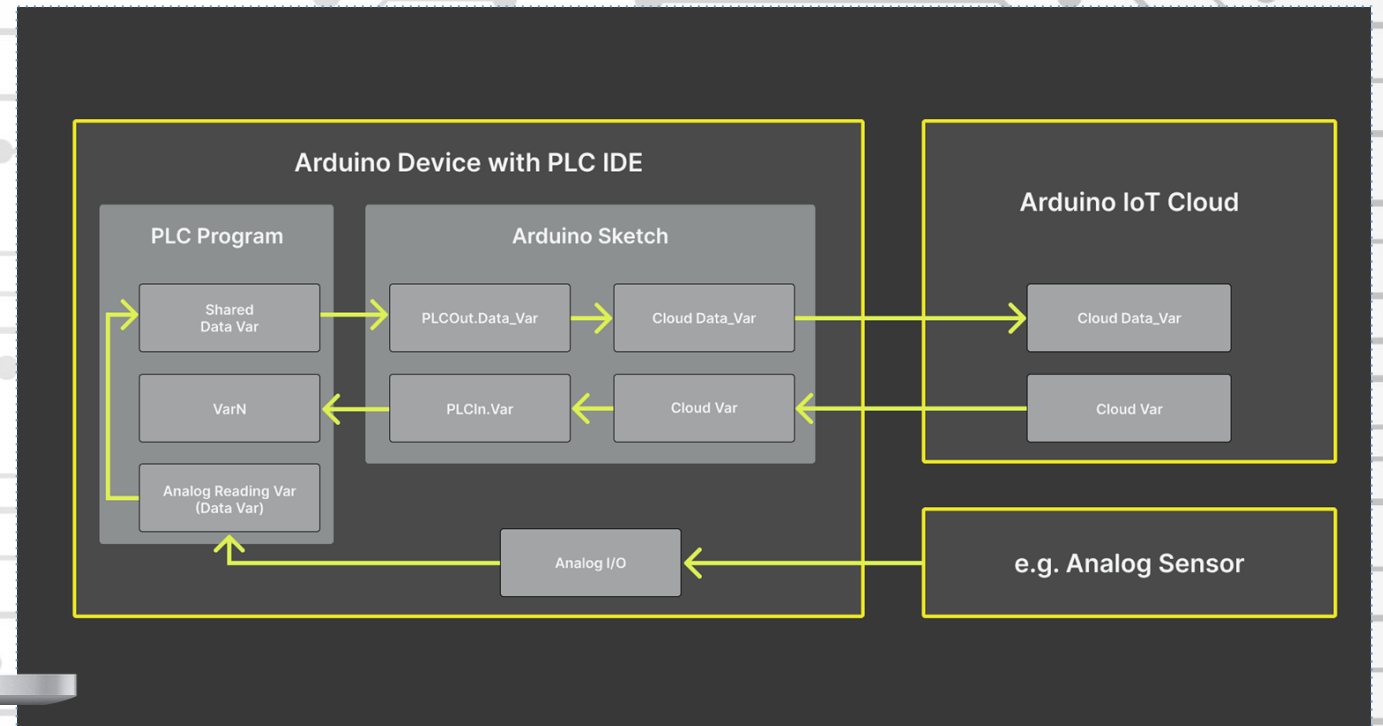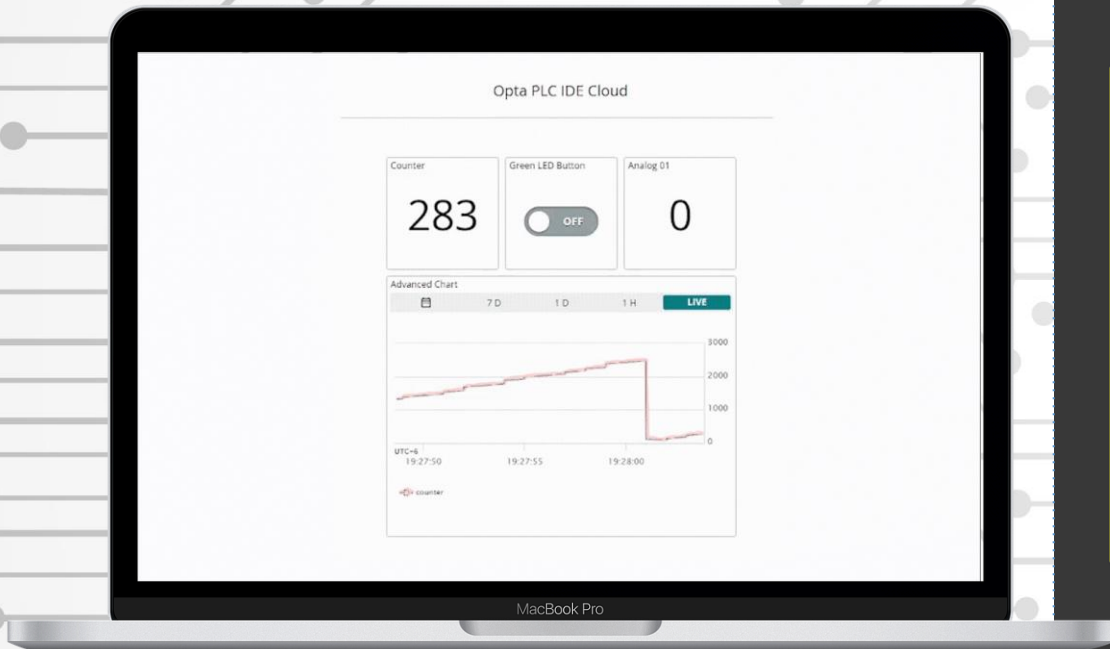
Security in every layer of ARDUINO PRO
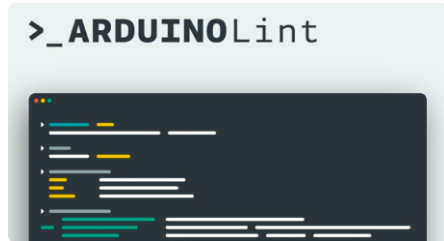
Cloud

aws **Amazon AWS infrastructure based Cloud**

2 Factor authentication

Auth0 **Mandatory authorization**

Middleware

OS (RTOS)

Drivers
(e.g. I2C)

>_ARDUINOLint

Arduino LINT:
- **Code security**
- **Vulnerability prevention**
- **Rules-based checks**

PRO MCUboot

Introducing the Arduino secure boot

MCUboot-based bootloader solution offering fail-safe firmware authentication and update

arduino.cc/pro

Secure Boot:
- **MCUboot**
- **Firmware authentication**
- **Secure updates**
- **Board security**
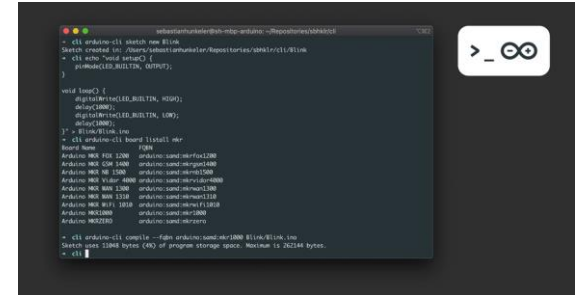
Arduino CLI:
- **Rigorous testing**
- **Penetration testing**
- **Bug bounty program**
- **Security enhancements**

Hardware

Encryption with Secure Element

Authentication and Access Control

Regular Security Updates

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Designing Automation & Embedded System
Arduino Pro shortens the design process

CHIP-DOWN DESIGN

| YEAR 1 | | | | YEAR 2 | | | YEAR 3 | | |

Y1 Q1 | Y1 Q2 | Y1 Q3 | Y1 Q4

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 28 29 30 31 32 33

TIME IN MONTHS

| POC (Proof Of Concept) | 1ST ARTICLE | PROTOTYPE | PRE-PROD/SOURCING | PRODUCTION | REVENUE |

ARDUINO PRO SoM DESIGN

POC | PROTOTYPE | PRODUCTION NRE & GO-TO-MARKET | Revenue

9 DAYS
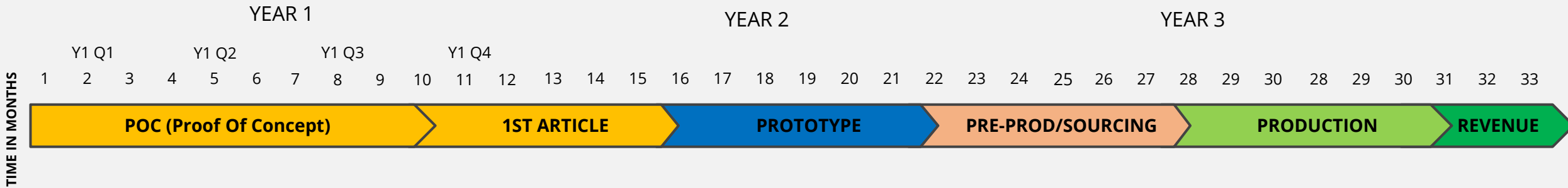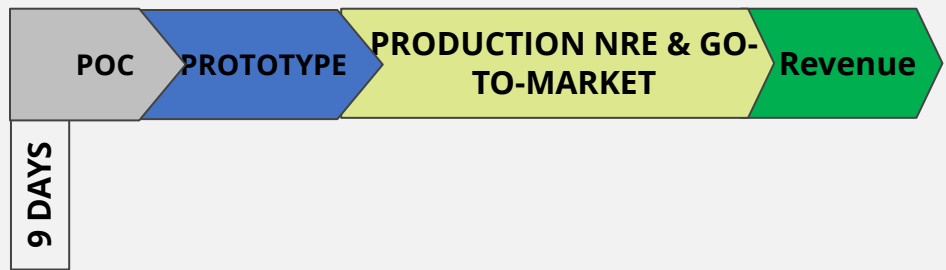
COST
RISK
TIME

Arduino Portenta SoM's compatibile with

NXP   ST   RENESAS

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Arduino Pro – application areas

MANUFACTURING / INDUSTRIAL OEM

BUILDING AUTOMATION

TRANSPORTATION / MOBILITY
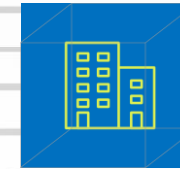
SMART CITIES

SMART AGRICULTURE

FOUNDATIONAL FEATURES

Connected Products

Asset Monitoring

Condition Monitoring & Predictive Maintenance

Wearables

Network Communication and Interfaces

Asset Location & Tracking

Worker Health & Safety

Speech Recognition

Arduino Pro - what can be achieved ?

RELIABLE & LONG LASTING

- **Quality check on every board**
- **10+ year performance**

ENCRYPTED & SECURE

- **Hardware and Firmware security**
- **Cloud security**
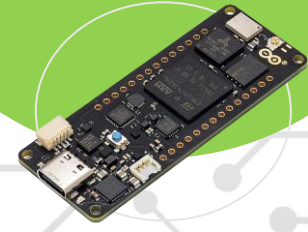
CLOUD INTEGRATION

CERTIFIED

BATTERY POWERED
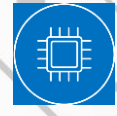
POWERFUL PROCESSING
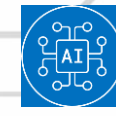
EDGE A.I.

IP & LICENSING

EMBEDDED SENSING

MULTIPLE CONNECTIVITY
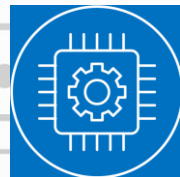
Embedded Electronics

Industrial Automation

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The Arduino Link: docs.arduino.cc

Support

DOCUMENTATION

Getting started, Datasheets libraries and user manual

docs.arduino.cc

COMMUNITY

Visit forum.arduino.cc to leverage the knowledge of community of 30M+ users

TRAINING

Do you need some training? We are here for you: arduino.cc/pro/contact-us

SUPPORT

You can always count on technical support, just reach out: arduino.cc/en/contact-us

HELP CENTER

Read FAQ and troubleshooting articles from Support team support.arduino.cc/hc

TUTORIALS AND EXAMPLES

Learn how to quickly get started with products on docs.arduino.cc/

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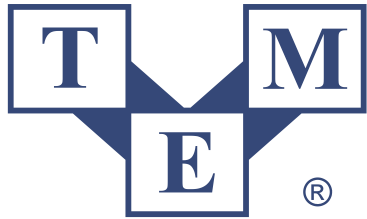
Summary / Q&A

- **Accelerate Time to Market**

- **No Vendor Lock-in & Interoperability**

- **Open-source & End-to-End Platform & Ecosystem**

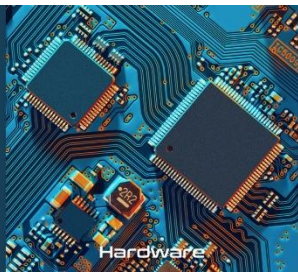   **Questions ?**

THANK YOU !

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Visit us on booth #2