arm

CMSIS & ML Partner Event

embedded world 2025

Reinhard Keil, Christopher Seidl, Joachim Krech

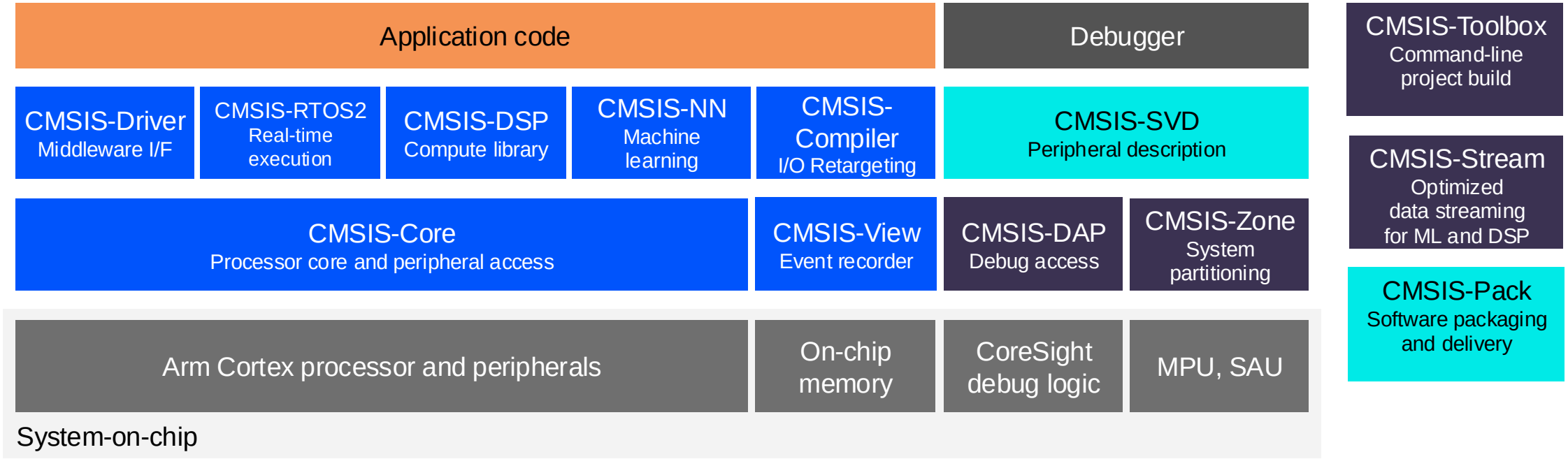
March 11th, 2025

Agenda

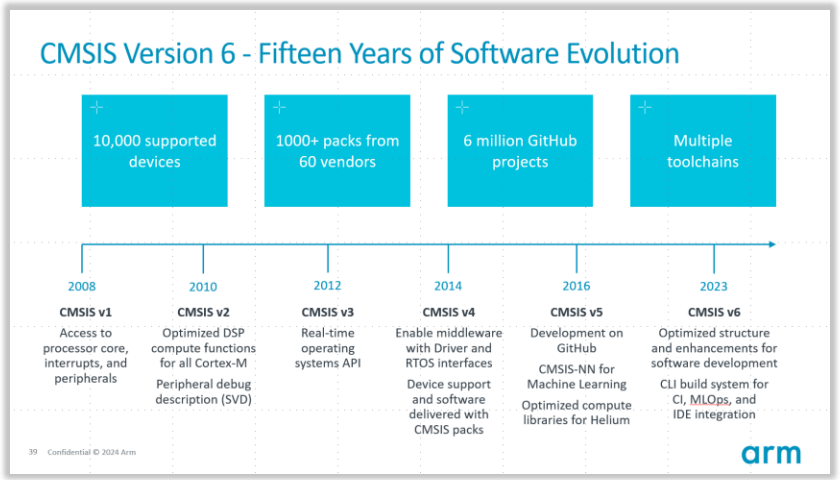
- State of CMSIS v6
- 2024 achievements
- CMSIS-Packs for device, board, and software support for scalable examples
- Arm commercial tooling
- Arm open-source tooling
- Roadmap
- Arm CMSIS Debug extension overview
- Collaboration with GitHub
- AI/ML tools and software with Edge Impulse
- Demo

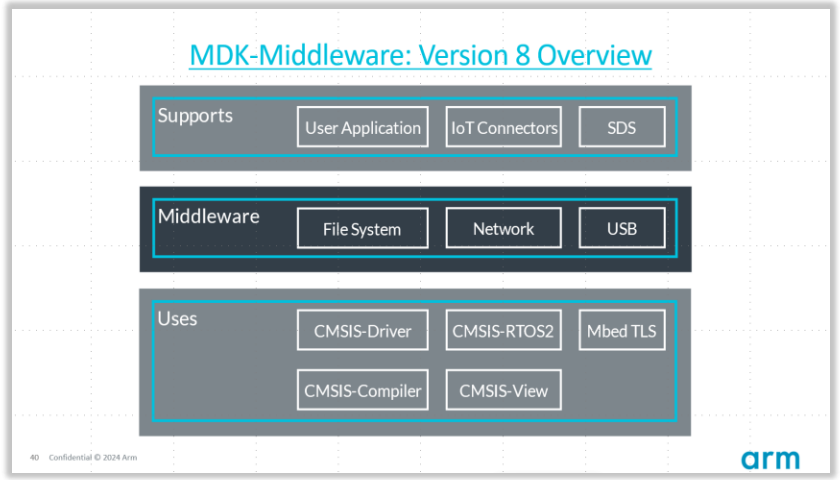
CMSIS Version 6

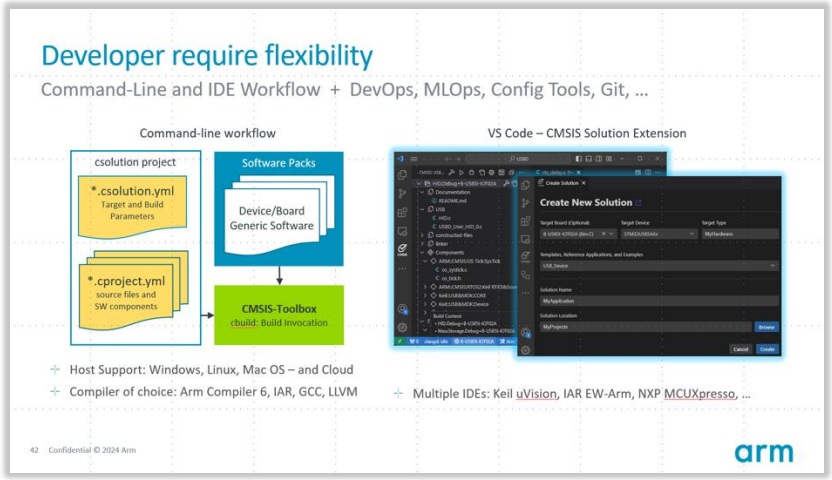
github.com/ARM-software/CMSIS_6



CMSIS – 2024 Achievements







2025 Focus

- Ease-of-Use
- Consistency
- Ecosystem
- VS Code Debug
- Zephyr
- Edge AI
- Arm Custom Instructions
- Cortex-A Transition

Create Consistent DFP and BSP – Training Material

Enables toolchain agnostic support for many third-party software components

Part 1

- Single core devices with C startup components
- Base-line contents of a BSP (documentation, tool-chain agnostic blinky example)
- Recording
- Slides

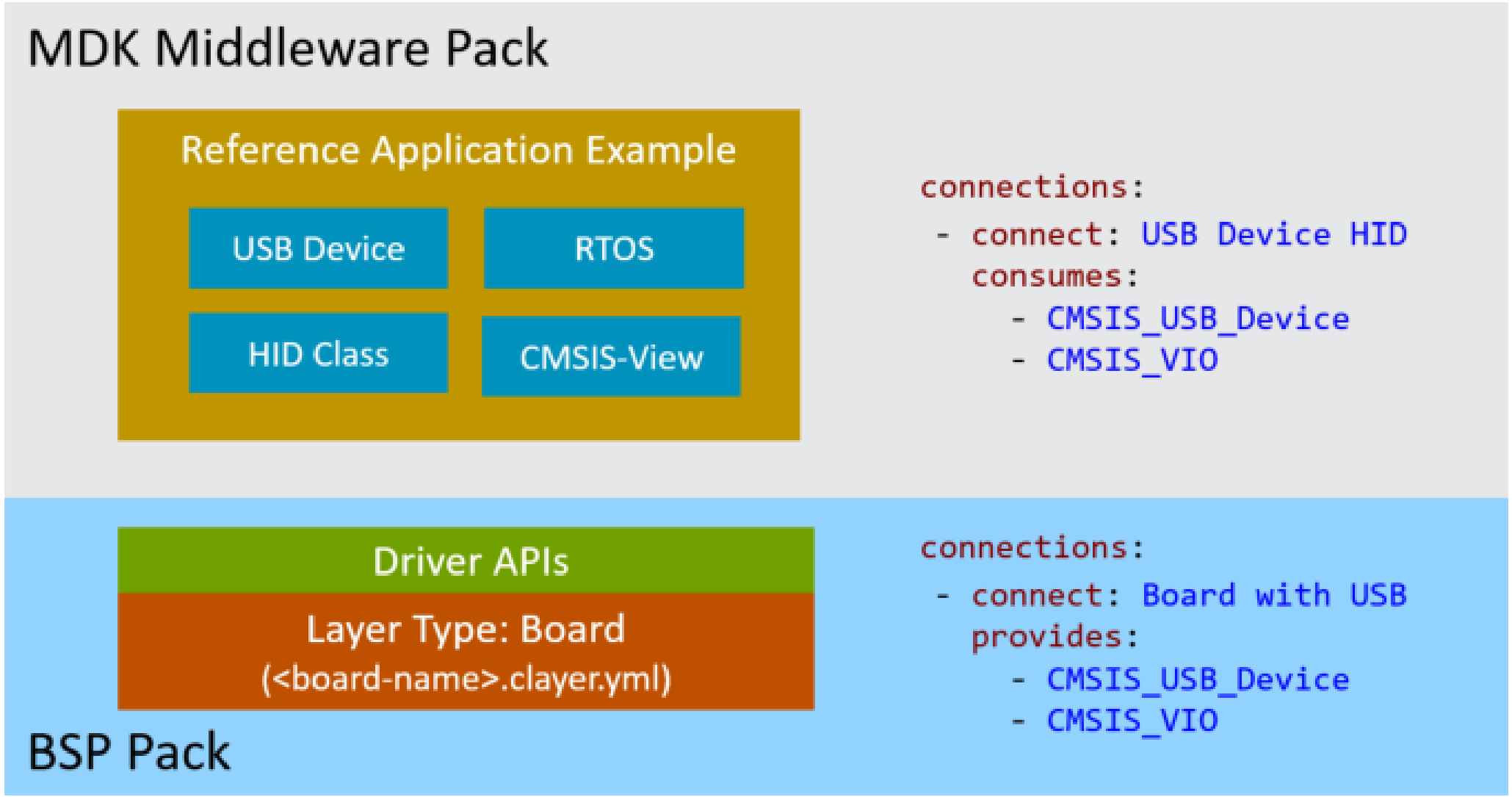
Part 2

- Devices that use a Configuration Generator
- Multi-core devices with tool-chain agnostic templates for different pre-configurations
- Create software layers based on driver standards to enable reference applications
- Recording
- Slides

Pack creation documentation: open-cmsis-pack.github.io/cmsis-toolbox/pack-tools/

CMSIS Example Applications

Exemplified on MDK-Middleware



CMSIS Ecosystem Software Stacks

keil.arm.com/packs

Graphics

Embedded Wizard
GUI Solutions by TARA Systems

LVGL

SEGGER
The Embedded Experts

CRANK
AMETEK

Middleware

aws

Mongoose

ORYX EMBEDDED

arm KEIL

wolfSSL

Machine Learning/DSP

ADVANCED SOLUTIONS NEDERLAND

EDGE IMPULSE

TensorFlow

TDK SensEI

RTOS

RT-Thread

Embedded Office

Quantum LeaPs
Modern Embedded Software

freeRTOS

arm KEIL

SEGGER
The Embedded Experts

Other

EmSA

SODIUS WILLERT

Memfault

redlogix

CMSIS

- CMSIS
- CMSIS-RTX
- CMSIS-DSP
- CMSIS-NN
- CMSIS-FreeRTOS
- CMSIS-View
- CMSIS-Stream
- CMSIS-Compiler

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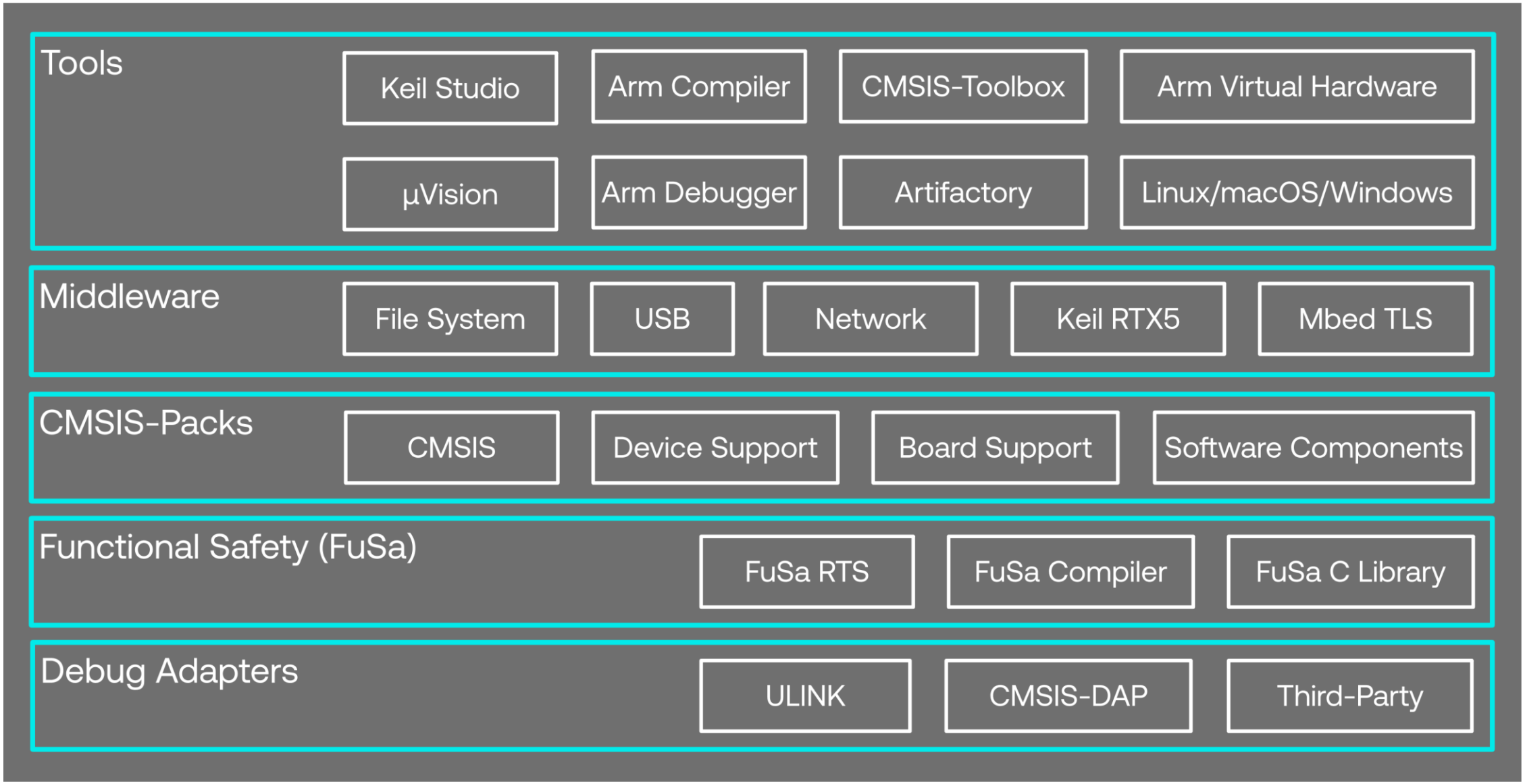
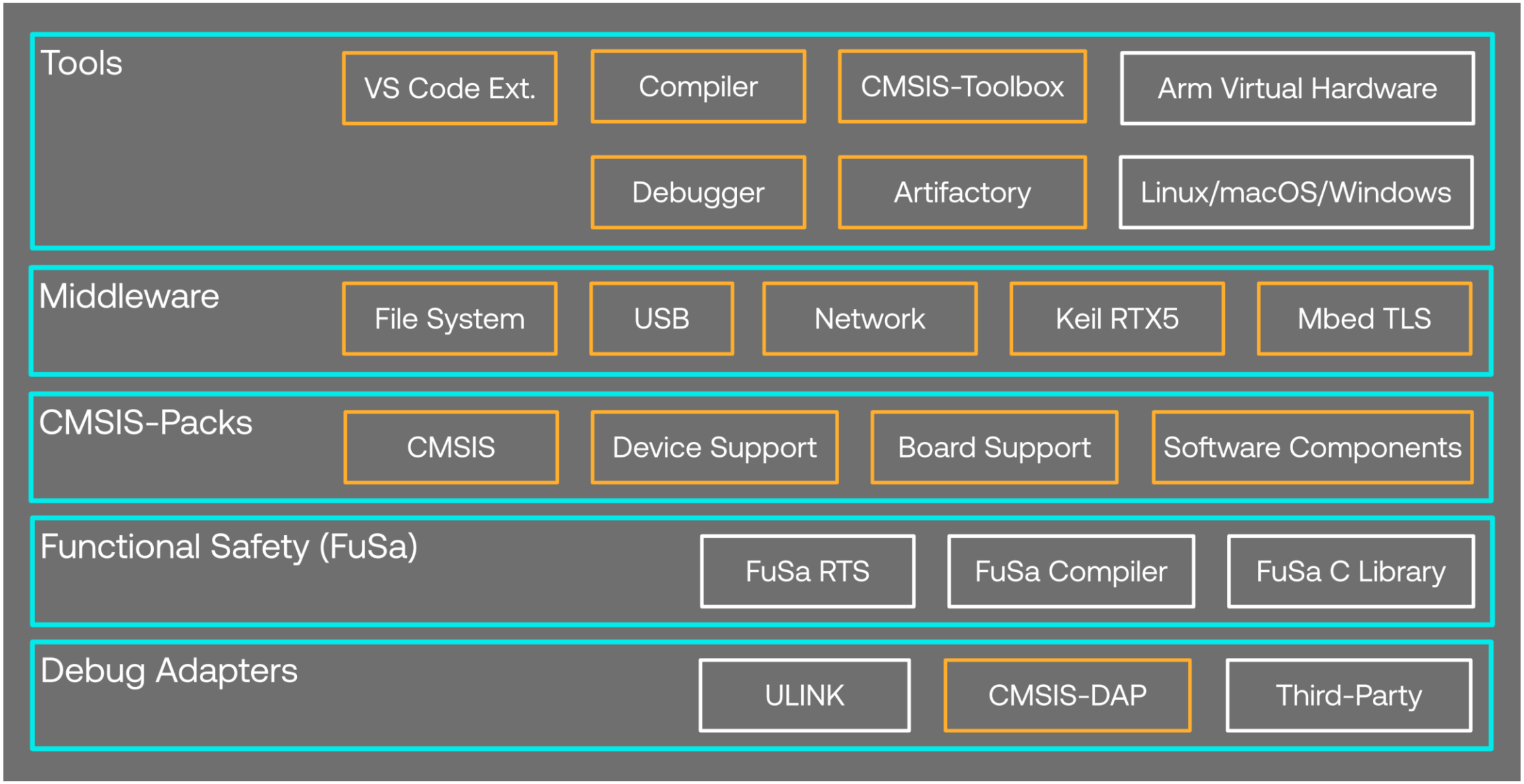
Keil MDK Version 6

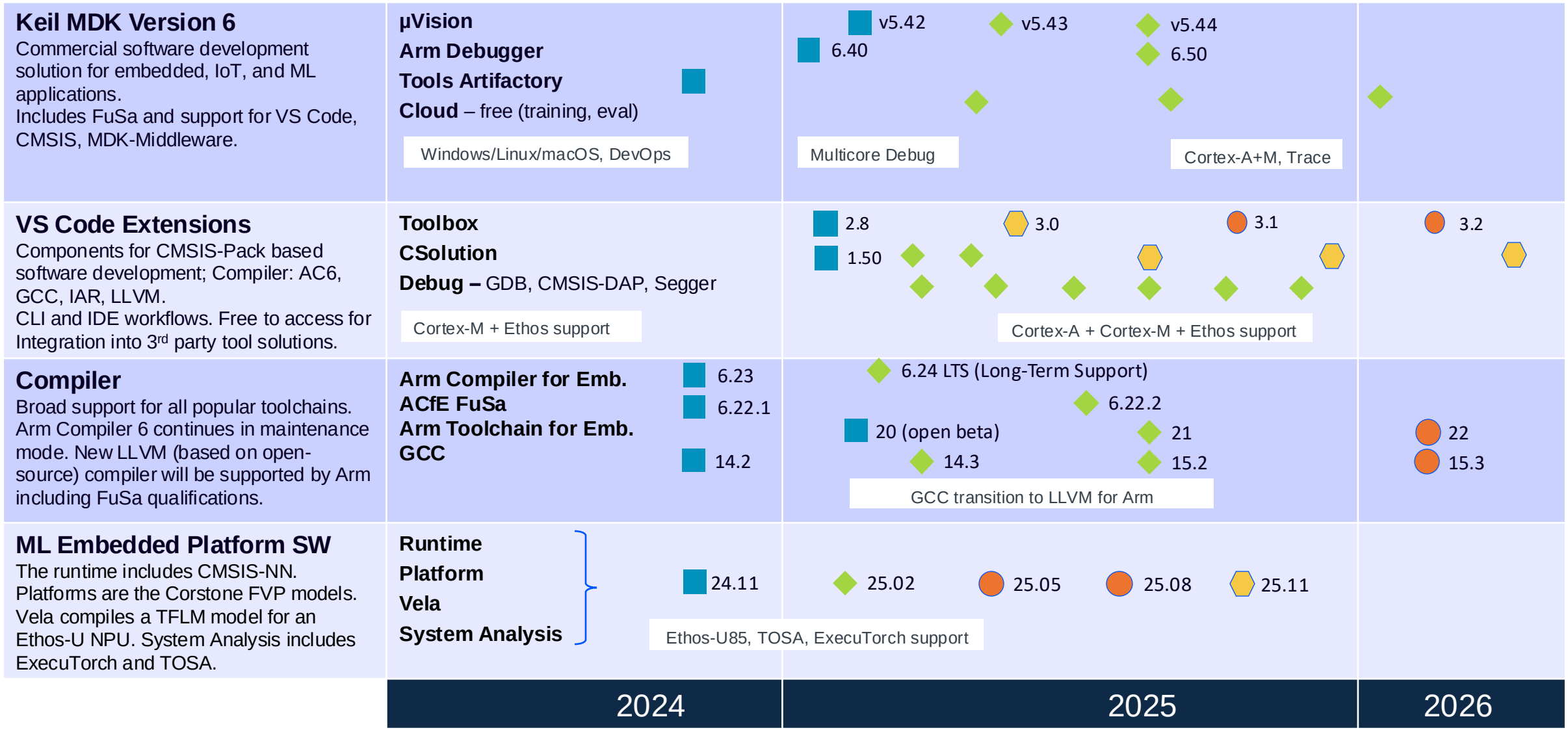


Keil MDK Version 6

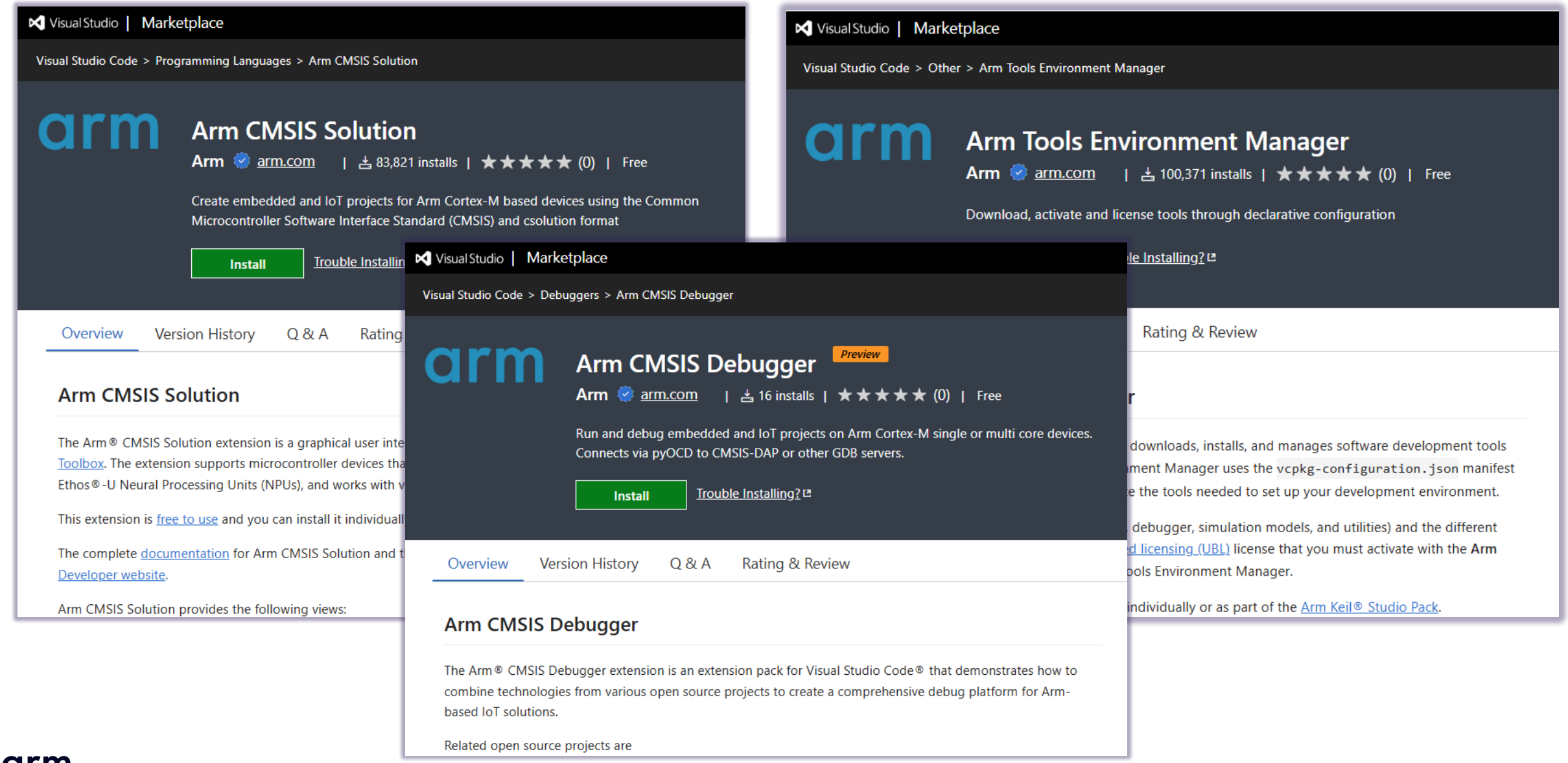


Open-source/free-to-use

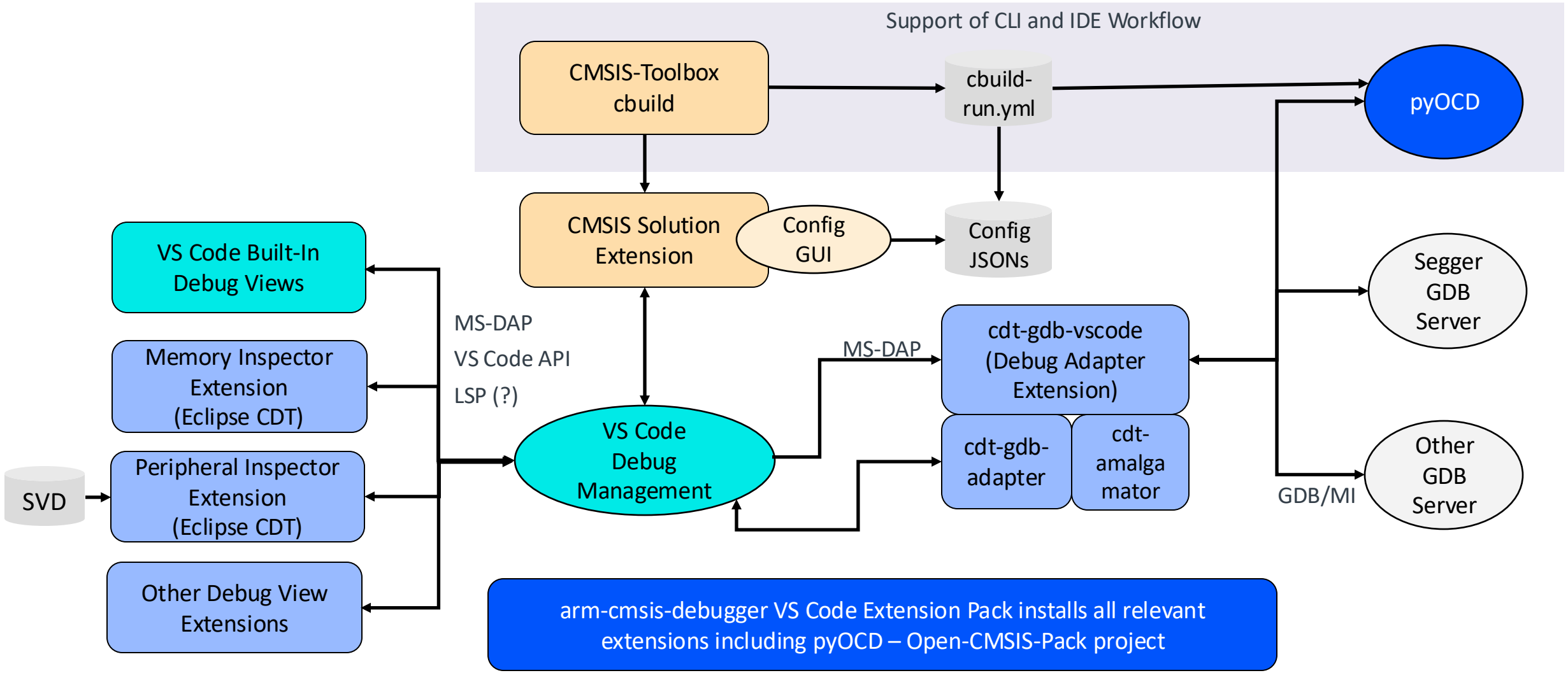
Tools Roadmap



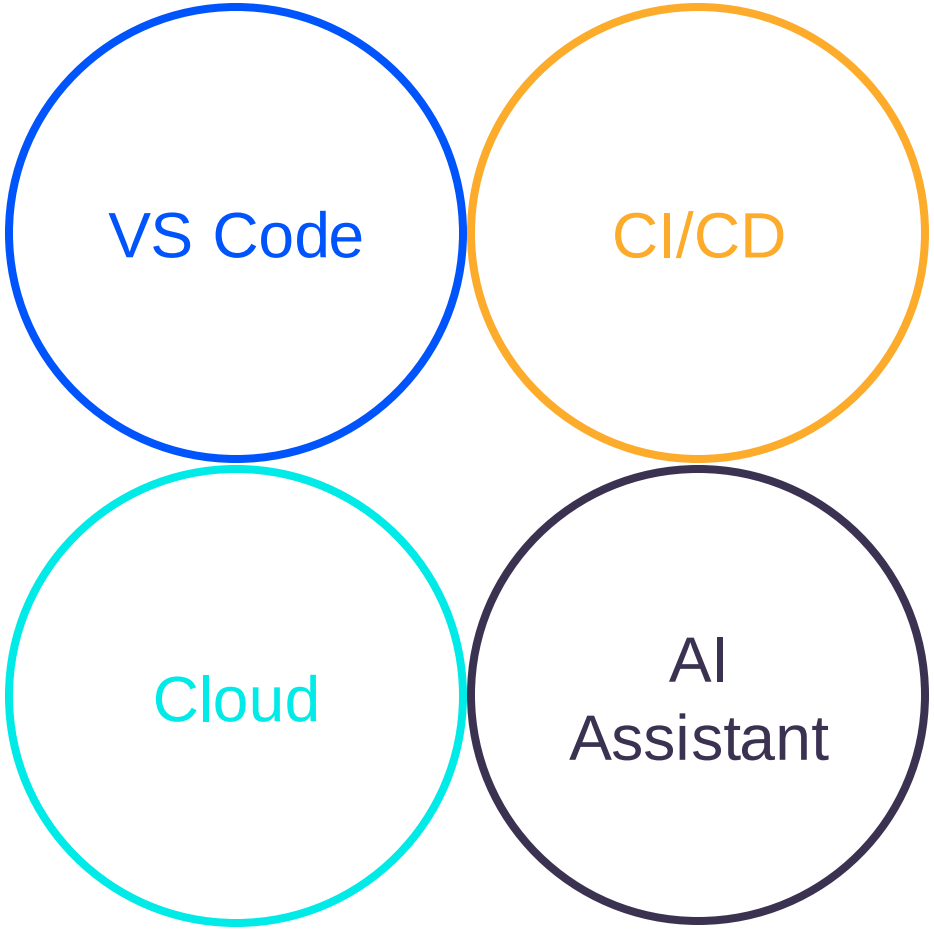
Free to use Extensions – Available on VS Code Marketplace



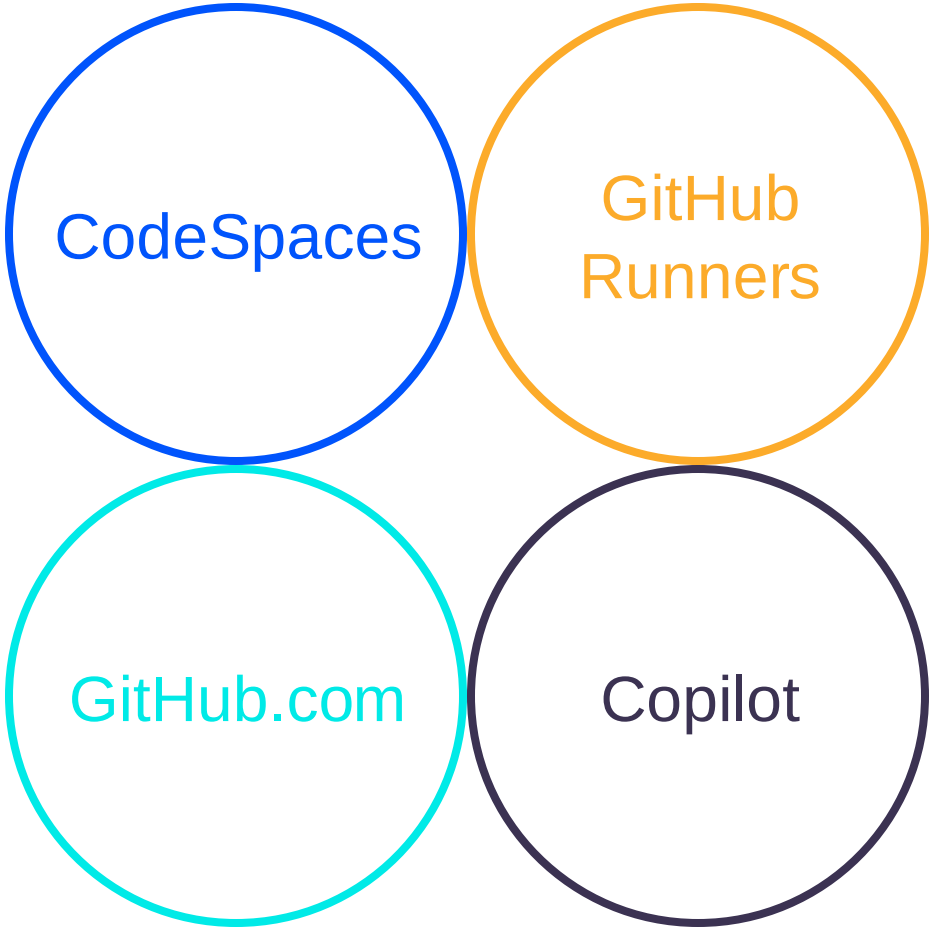
VS Code Extensions and Tools for CMSIS Software Development

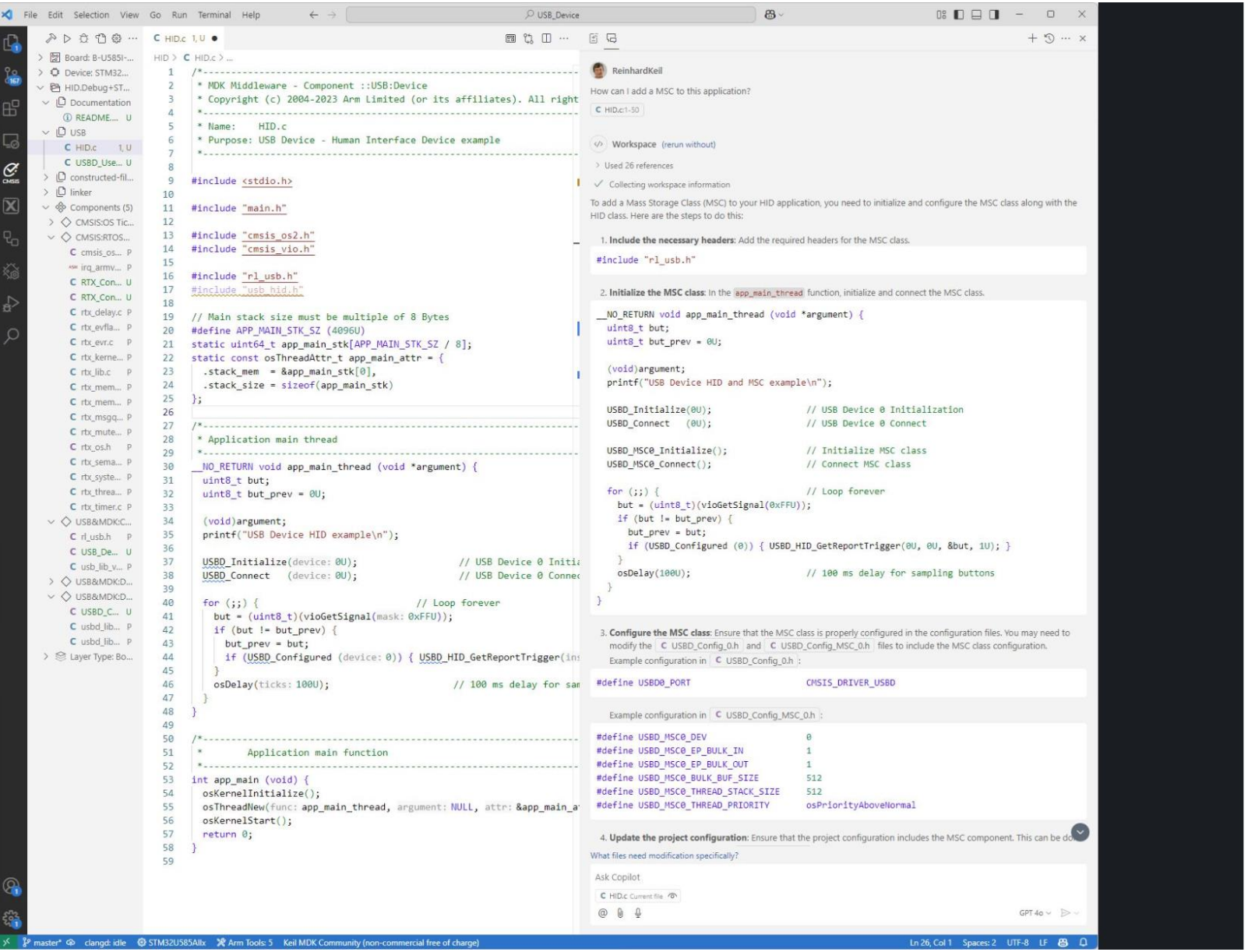


Modernized Workflows



GitHub Collaboration





Reinhard Keil · 1st
Senior Director of Embedded Technology a...
2w ·

Does **GitHub #Copilot** help **#embedded** programmers?

Recently, I experimented with Copilot in **#VSCode**. As Copilot is trained using **#CMSIS** and **#MDK**-Middleware, I expected that this is useful. But the result exceeded my expectations.

I started from an USB HID Device example provided with MDK Middleware and entered the prompt: "How can I add a MSC to this application?" As Copilot understands the CMSIS *csolution project*, the answer was right to the point. It gave me instructions for adding a USB Mass Storage Class with required files, components, and configuration settings. An amazing result. My conclusion: Copilot does not repla ...more

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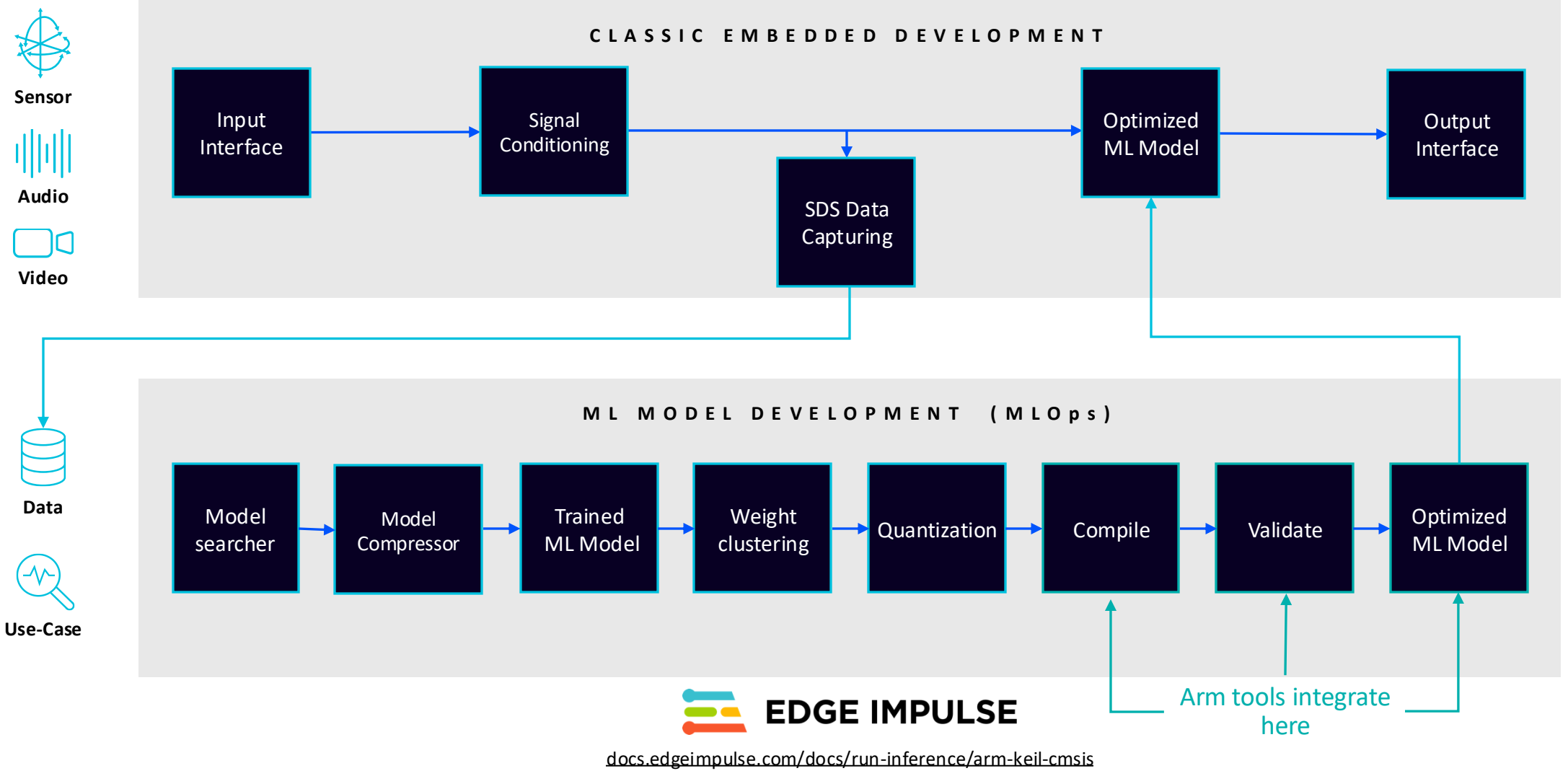
GitHub

Clay Nelson, GitHub
March 11th, 2025

Development Flow for Edge AI Devices

Watch the webinar

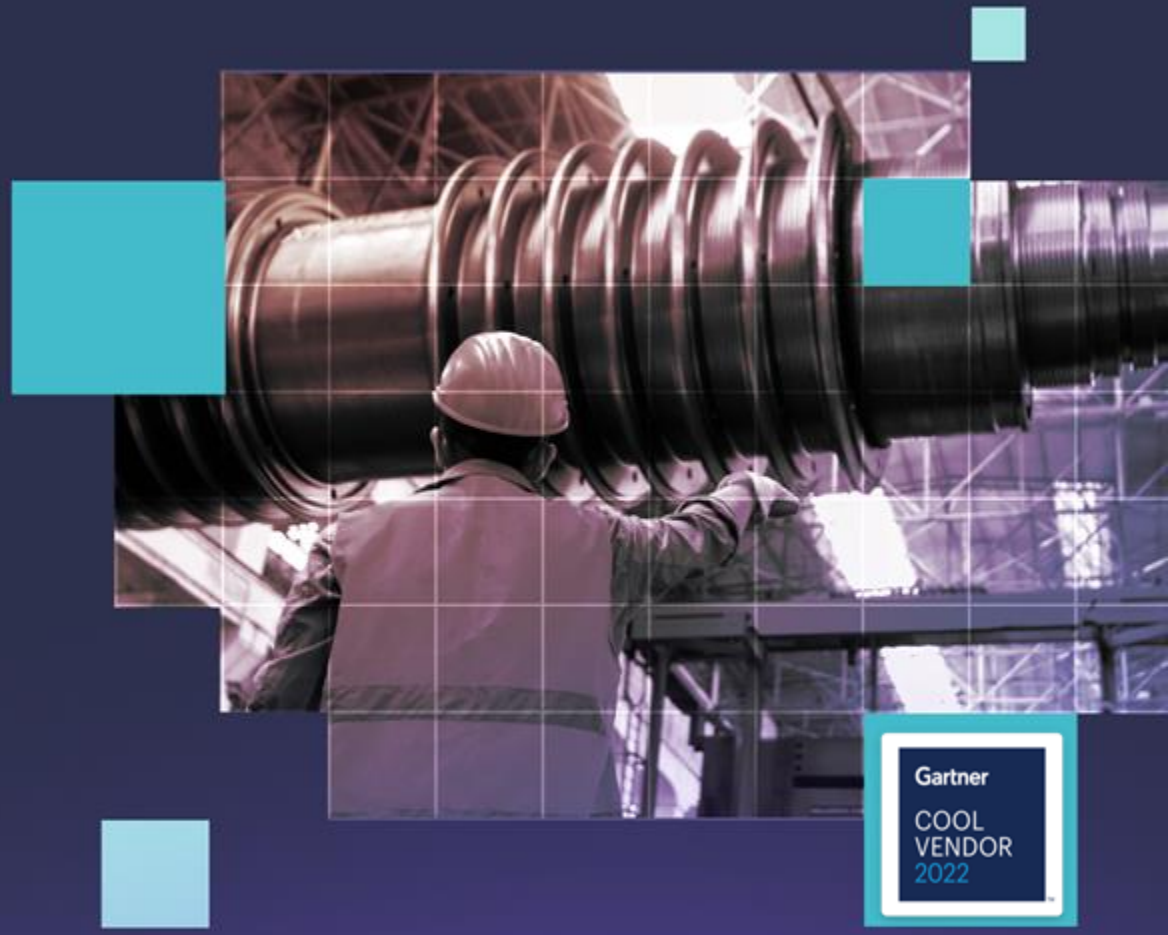


EDGE IMPULSE

docs.edgeimpulse.com/docs/run-inference/arm-keil-cmsis

EDGE IMPULSE

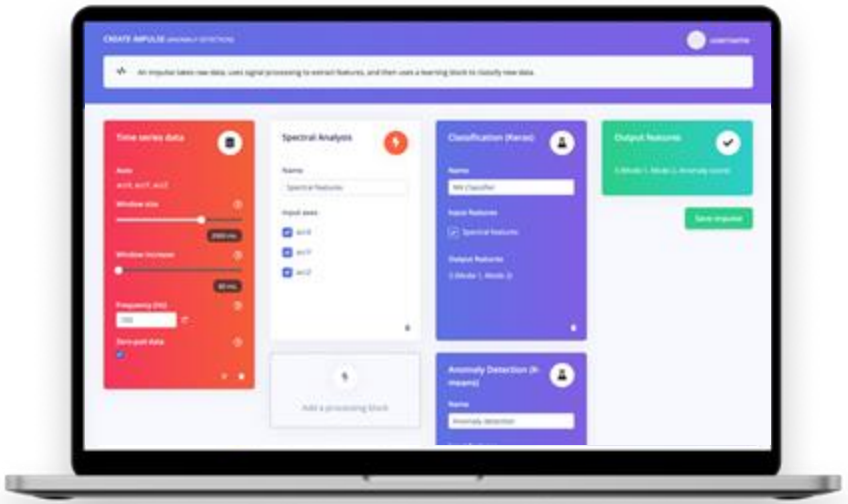
CMSIS Packs in Edge Impulse



Arjan Kamphuis

Embedded Lead, Edge Impulse

Edge AI with Edge Impulse



Open-CMSIS Pack

Collect

Build a high-quality datasets

Build

Find optimal DSP and model within constraints

Optimize

Tune model for on-device performance

Deploy

Configure and package for chosen edge device

CMSIS pack deployment

Library deployment options

Open CMSIS pack
Generates a CMSIS Software Component pack.

Ethos-U55-128 Open CMSIS Pack
A C++ library in Open CMSIS pack format with for devices with an Ethos-U55-128 NPU, High End Embedded with shared SRAM. For example: Alif E7 RTSS-HE.

Alif AI/ML Kit Gen2 HP core
Binaries containing both the Edge Impulse data acquisition client and your full impulse.

Thanks!

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Booth #4-505

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EDGE IMPULSE

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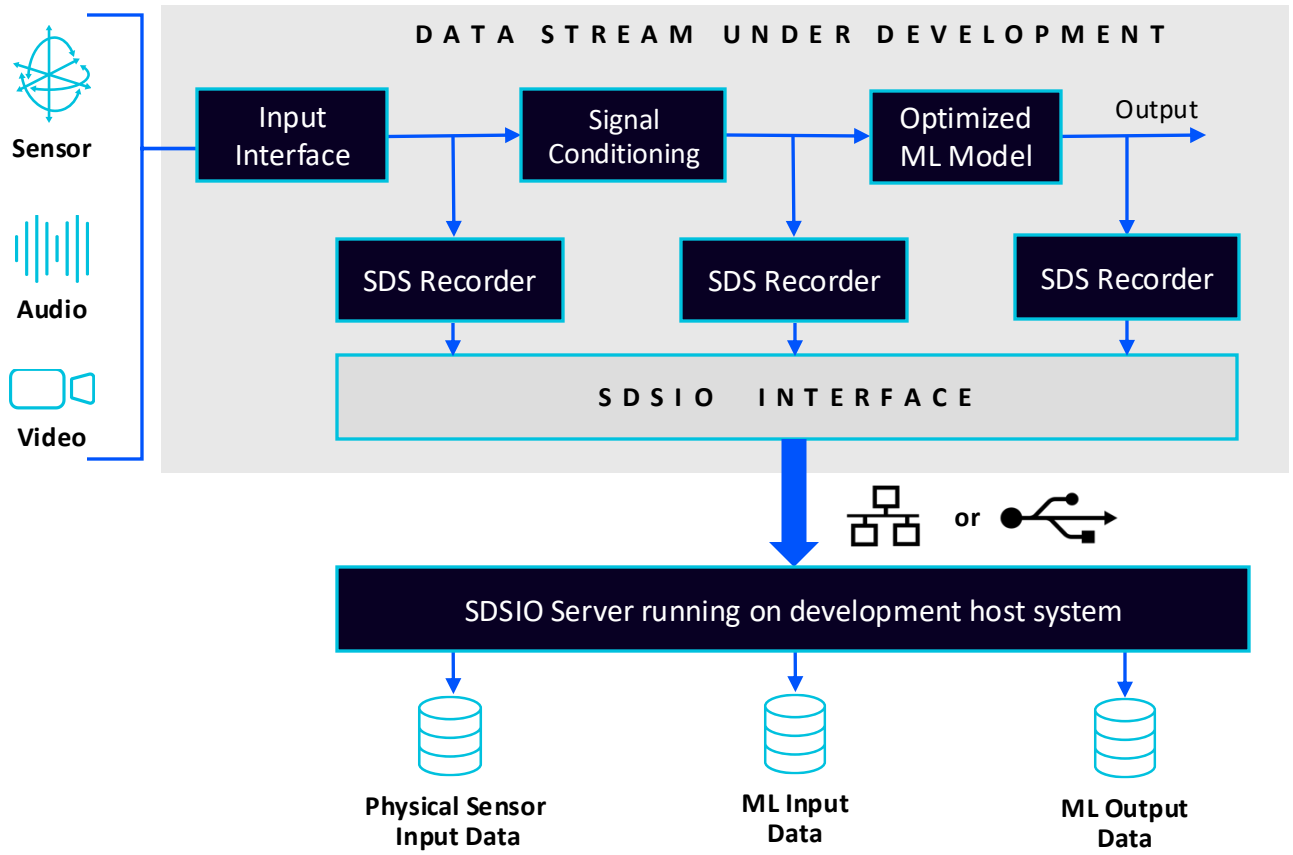
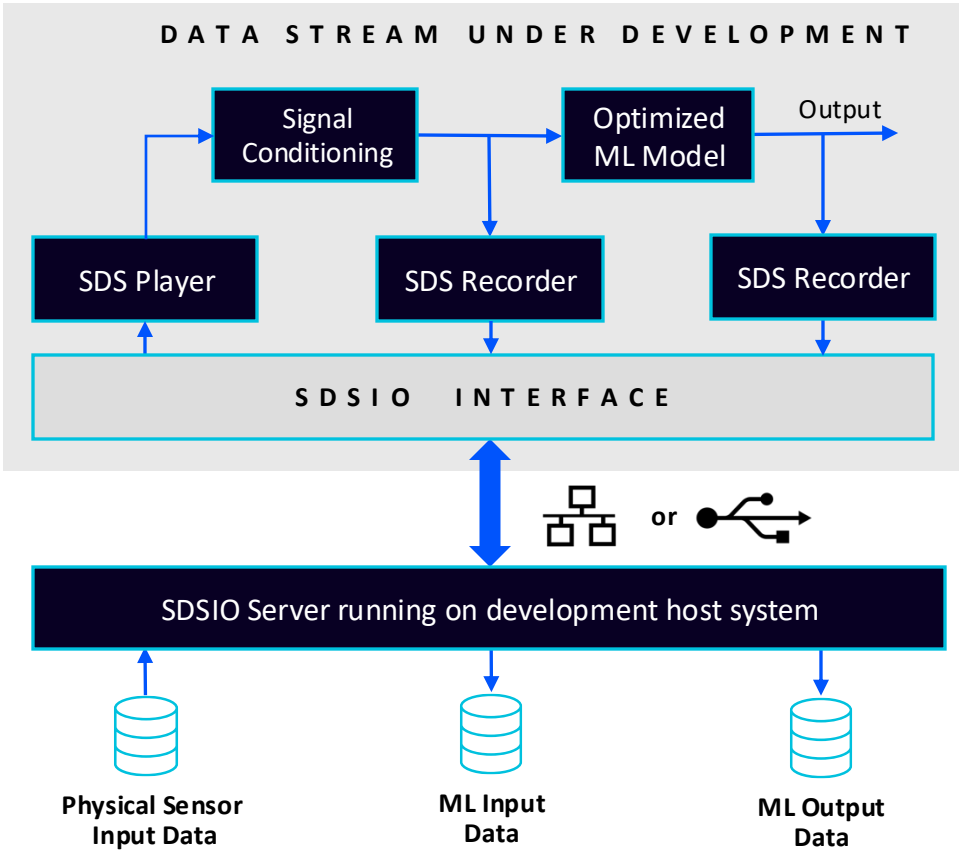
The Challenge: Get Real World Data

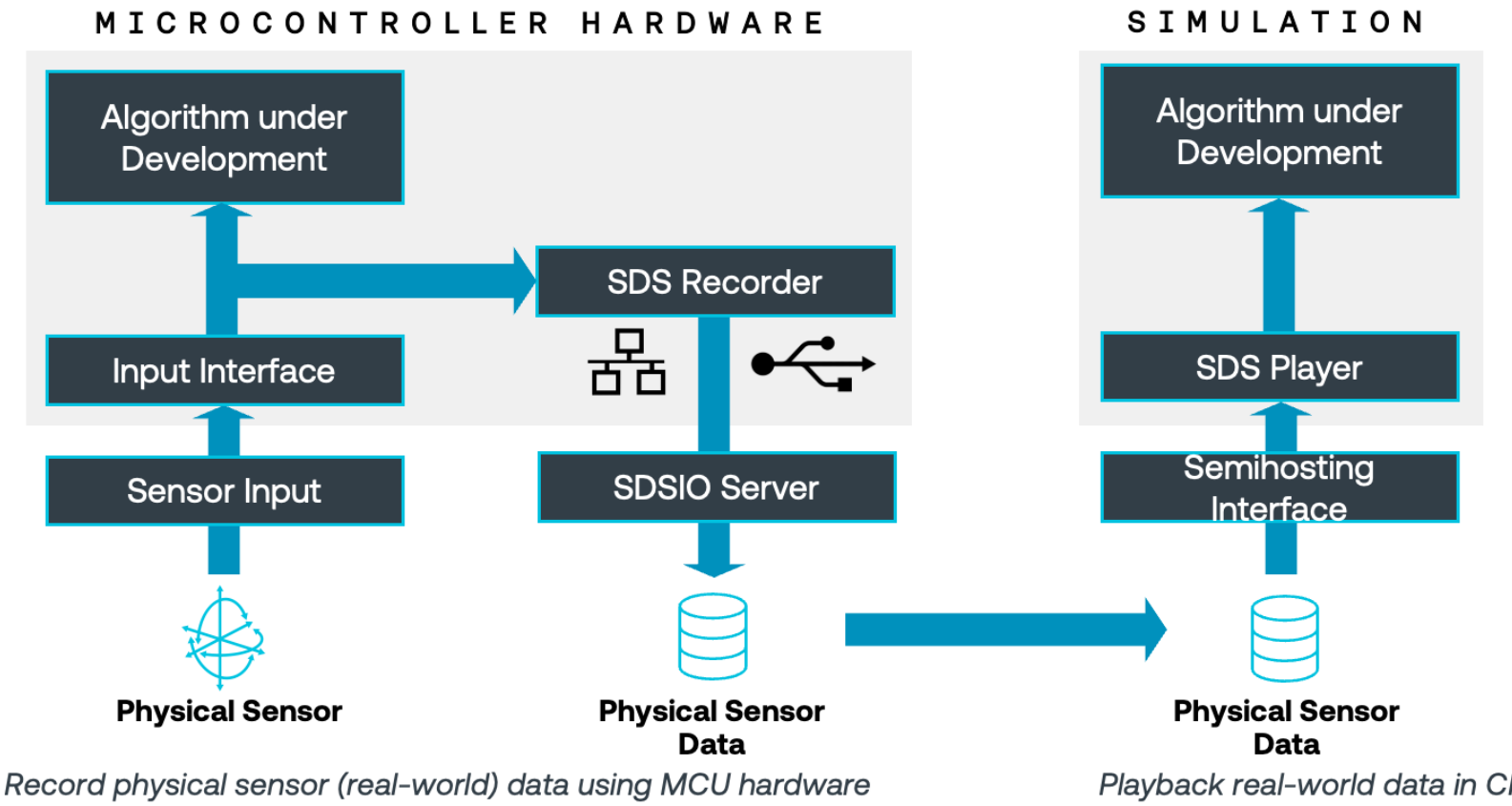
github.com/ARM-software/SDS-Framework





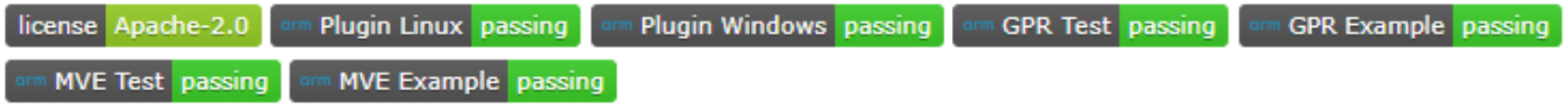
SDS-Framework Usage

- Validate physical input signals from sensors or output of algorithms.
- Input to DSP development tools (such as filter designers) or MLOps systems (for AI model training).
- CI test automation using Arm Virtual Hardware (AVH-FVP).



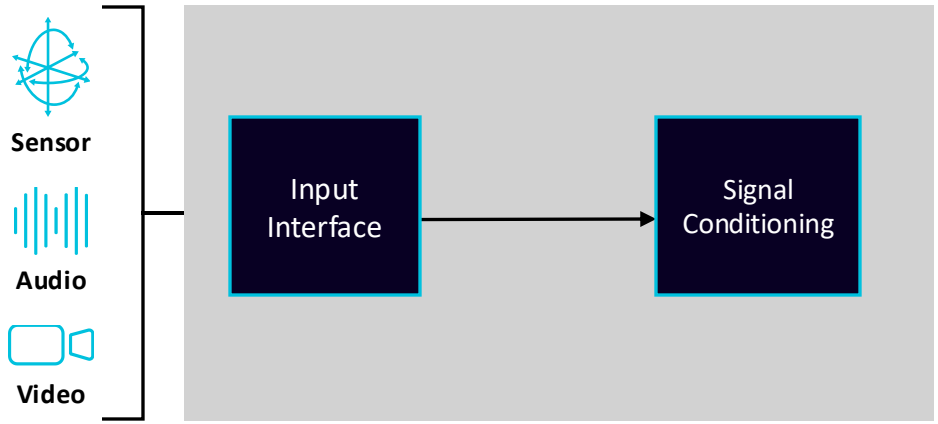
Arm Custom Instructions – Made Easy

github.com/Arm-Software/ACI-GetStarted



Get Started with Arm Custom Instructions (ACI)

Arm Custom Instructions (ACI) extend Arm processors with application-specific instructions to optimize the performance of algorithms. ACI is currently implemented on Cortex-M33, Cortex-M52, Cortex-M55, and Cortex-M85 processors using the **Custom Datapath Extension (CDE)**. It extends the processor with a custom compute pipeline for accelerators that avoids the overhead of the co-processor interface.



- Example use cases:
- Sine and cosine trigonometric functions
- Image pixel manipulations
- CRC
- …

Please fill in

2025 Edge AI Developer Survey

This survey is prepared by

arm

With generous support from our partners

PyTorch

Raspberry Pi

EDGE IMPULSE

EDGEAI FOUNDATION

arm

Demo

Joachim Krech
March 11th, 2025

arm

Merci
Danke
Gracias
Grazie
谢谢
ありがとう
Asante
Thank You
감사합니다
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Kiitos
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Köszönöm