



# Why NXP is doubling down on Zephyr

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Author: Rick Weston (UK) <https://www.flickr.com/photos/89492733@N00> License:Wikimedia Commons  
Edited by NXP for soft edge effect



# Why we got involved at the start (2016)

Recognized probable transition towards open-source software in microcontrollers

Good alignment with NXP's priorities ...

The screenshot shows a news article with the following details:

- Section:** Announcements
- Title:** The Linux Foundation Announces Project to Build Real-Time Operating System for Internet of Things Devices
- Date:** February 17, 2016
- Text:** Open source Zephyr™ Project aims to deliver an RTOS; opens call for developers to help advance project for the smallest footprint IoT devices
- Summary:** SAN FRANCISCO – February 17, 2016 – The Linux Foundation, the nonprofit organization enabling mass innovation through open source, today announced the Zephyr™ Project. This open source collaborative effort will unite leaders from across the industry to build a real-time operating system (RTOS) for the Internet of Things (IoT).
- Footnote:** Key support for the Zephyr Project includes Intel® Corporation (including its acquired business groups Altera Corporation and Wind River), NXP Semiconductors N.V. (including its recent merger with Freescale), Silicon Labs, Inc., and Ubiquiti® Technology United. Zephyr Project is in no way affiliated with this technology or its companies.



We are committed to keeping our customers ahead of the competition and helping them to prepare for change

- Everything Aware
- Everything Smart
- Everything Connected
- Everything Efficient
- Everything Safe and Secure

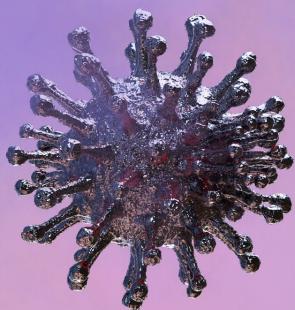
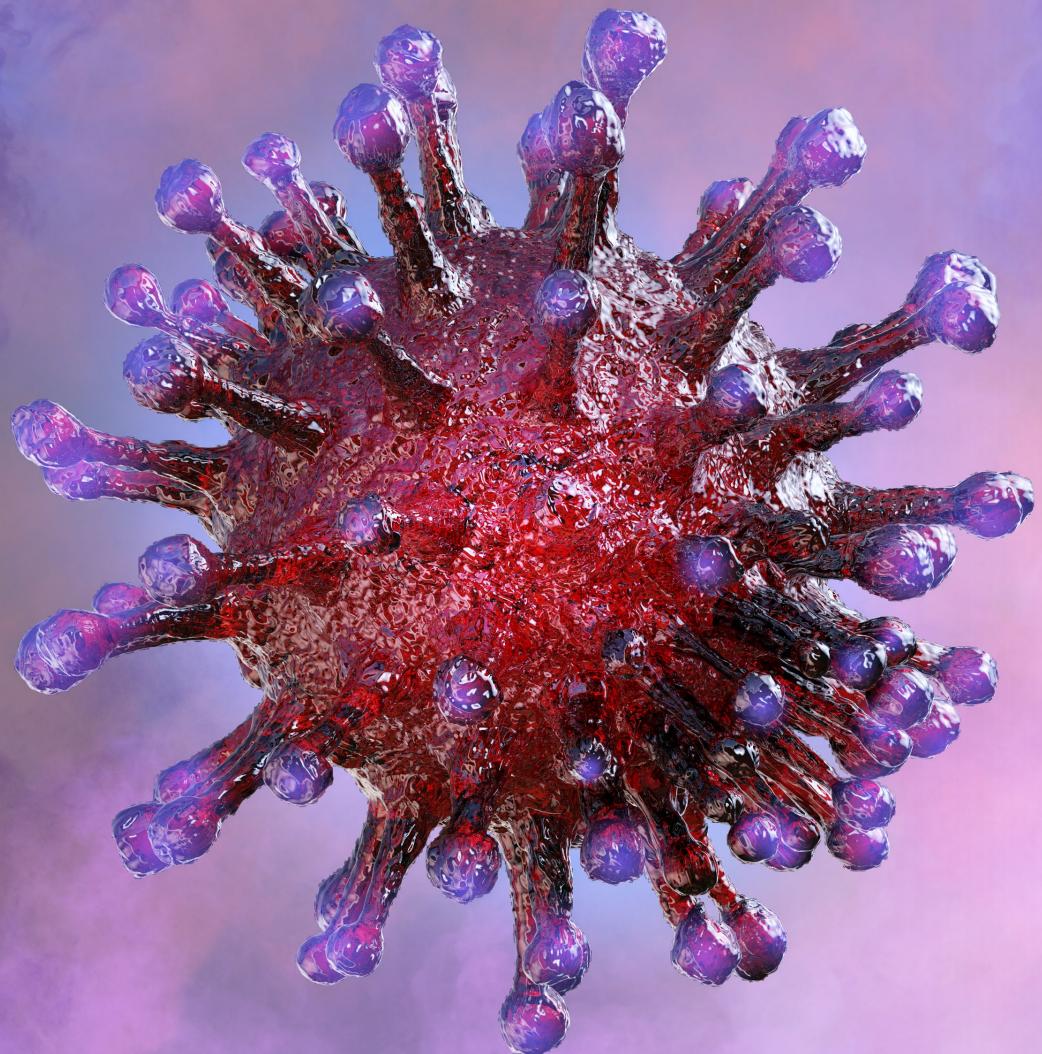


The Zephyr Project strives to deliver the best-in-class RTOS for **connected** resource-constrained devices, built to be **secure and safe**

# NXP's initial approach

## 2016 to 2019

- Committed as a platinum member to help ensure project had enough momentum to succeed
- Involvement in several Working Groups
- Steadily increasing commitment as maintainers
  - SDHC, Disk, ...
- Core team focused on upstreaming platform support for newer MCUs
  - i.MX RT crossover processors, LPC5500 series
- Steadily increasing levels of interest in Zephyr



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## **Supply chain issues brought portability into sharp focus at OEMs**

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Chip shortages forced companies to look  
at more robust supply chain strategies

Flexibility to move between devices from  
one vendor and/or dual sources

...the need for PORTABILITY





## Post pandemic, supplies have returned to normal

...so why are multiple  
companies still moving  
quickly to a Zephyr strategy?



# OEMs want to move faster without increasing R&D

Code reuse across product range

Easier configurability for platform capabilities

Better test infrastructure



# Need for scalability between Heterogenous and pure MCU products

Cost reduction opportunities from new technology introductions

Demands for higher performance in factory automation

Energy/performance trade offs

Integration of Cortex-A & M cores

Linux <> Zephyr transition easier than with a traditional RTOS



## Cyber resiliency laws

New EU cyber resiliency legislation rules require 5 years or expected lifetime of software support<sup>1</sup>

New burden on OEMs; requires confidence that RTOS choice will be supported...

...beyond the strategic decisions of one or two companies



1. Security, Help Net (2 March 2023). "Cyber resilience in focus: EU act to set strict standards". Help Net Security. Retrieved 18 May 2023.

# Zephyr better enables a solutions focus at NXP

- Our Goal: Bring value in enabling technologies and segment solutions
- Solutions spanning from examples and proof-of-concept platforms to full reference designs
- Developing on Zephyr enables rapid deployment to different platforms  
...while still enabling differentiation by utilizing underlying hardware

The screenshot shows the NXP Application Code Hub interface. At the top, there's a search bar with a magnifying glass icon and the placeholder "Search...". Below it, a navigation bar has tabs for "Application Format" (which is selected, indicated by a green border) and "Zephyr Project" (with a close button). The main content area displays a card for a project named "ML State Monitor". The card includes the following details:

- ML State Monitor**
- FRDM-K66F, LPCXpresso55S69, MIMXRT1170-EVK
- A descriptive text: "This repository holds the ML-Based System State Monitor App SW Pack and depends on the MCUXpresso SDK overall delivery. This Application ..."
- Application Format:** Zephyr Project
- Categories:** Anomaly Detection, Tools, RTOS, Sensor, AI/ML, SDMMC

On the left side of the main content, there's a sidebar with sections for "Device Families", "Item Type", "Application Format" (with options: CMSIS Pack, Project File (MCUX/MDK/IAR), and Zephyr Project, where "Zephyr Project" is checked), and "Toolchains" (with options: CodeWarrior, GCC, IAR, MCUXpresso IDE, MDK, and VS Code). A "Clear All Properties" button is located at the bottom of this sidebar. At the bottom of the page, there are links for "Privacy Policy", "Terms of Use", "Contact", and "Accessibility".

# Comparing two architectures from NXP's microcontroller portfolio

## i.MX RT10xx family

- Arm® Cortex®-M7
- Flashless
- External quad flash/PSRAM and SDRAM interfaces
- Peripheral set in common with i.MX microprocessors
- Very high-speed core (600MHz)
- Medium power consumption

## MCX N family

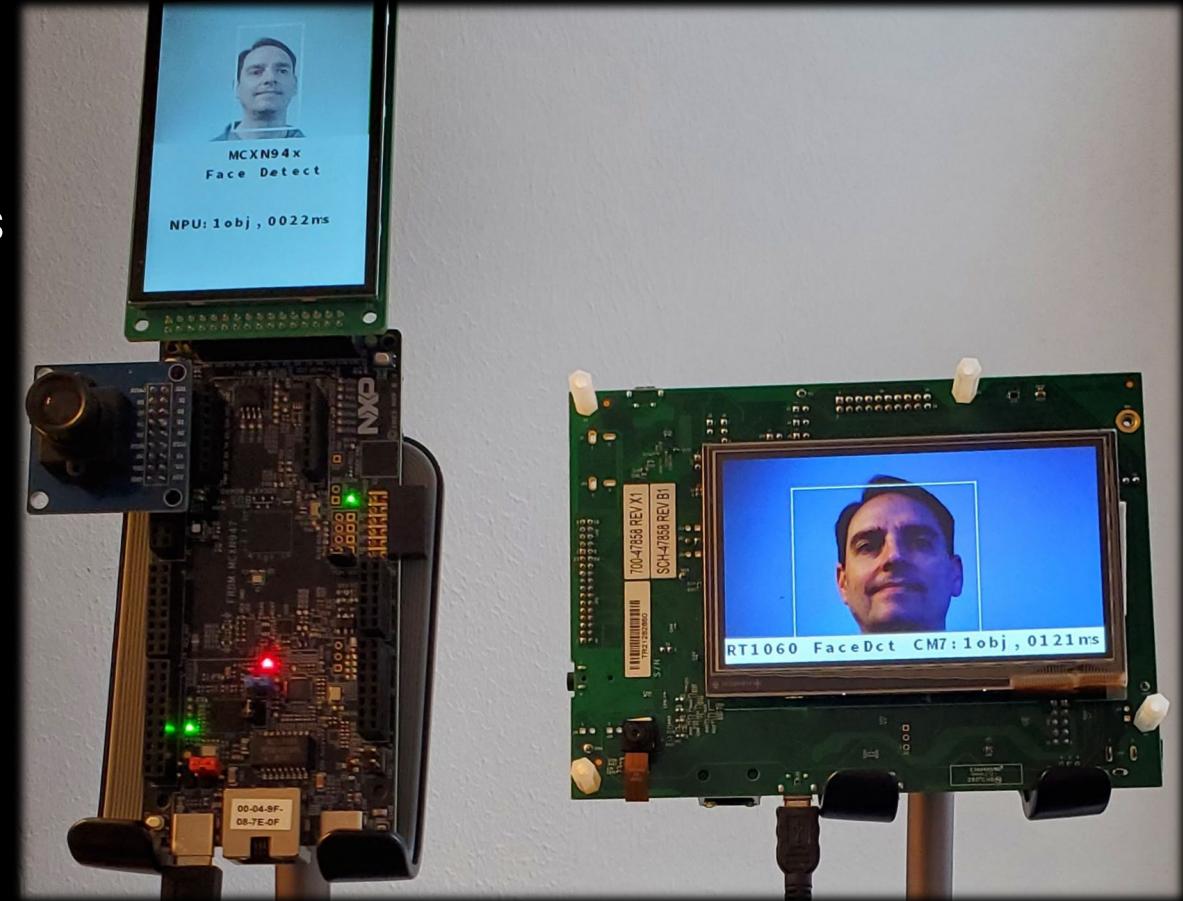
- Arm® Cortex®-M33
- On-board flash
- External quad SPI / PSRAM interface
- Peripheral set developed from LPC and Kinetis predecessors
- Medium speed core (150MHz)
- Very low power consumption
- On-chip Neural Processing Unit (NPU)

# Example application: Face Detection

Same application running on  
MCX N and i.MX RT1060

Different architectures can leverage Zephyr's robust Hardware Abstraction Layer (HAL), while still leveraging platform benefits

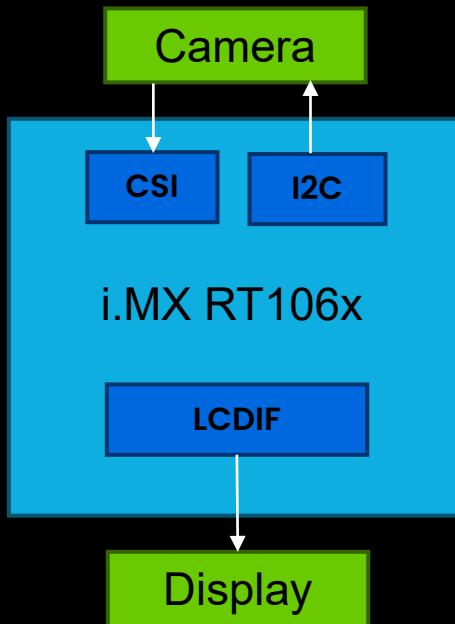
- MCX N94x leveraging the NPU hardware for faster inference times
- i.MX RT1060 running a software model
- Different cameras, displays, and interfaces



# Hardware platforms

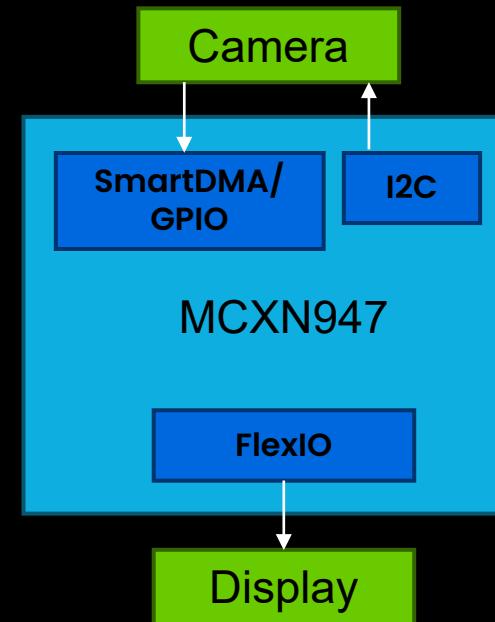
## i.MX RT1060 series platform

- [MIMXRT1060-EVKB](#)
- [RK043FN66HS-CTG](#) LCD panel
- [On Semi MT9M114](#) SoC-type sensor



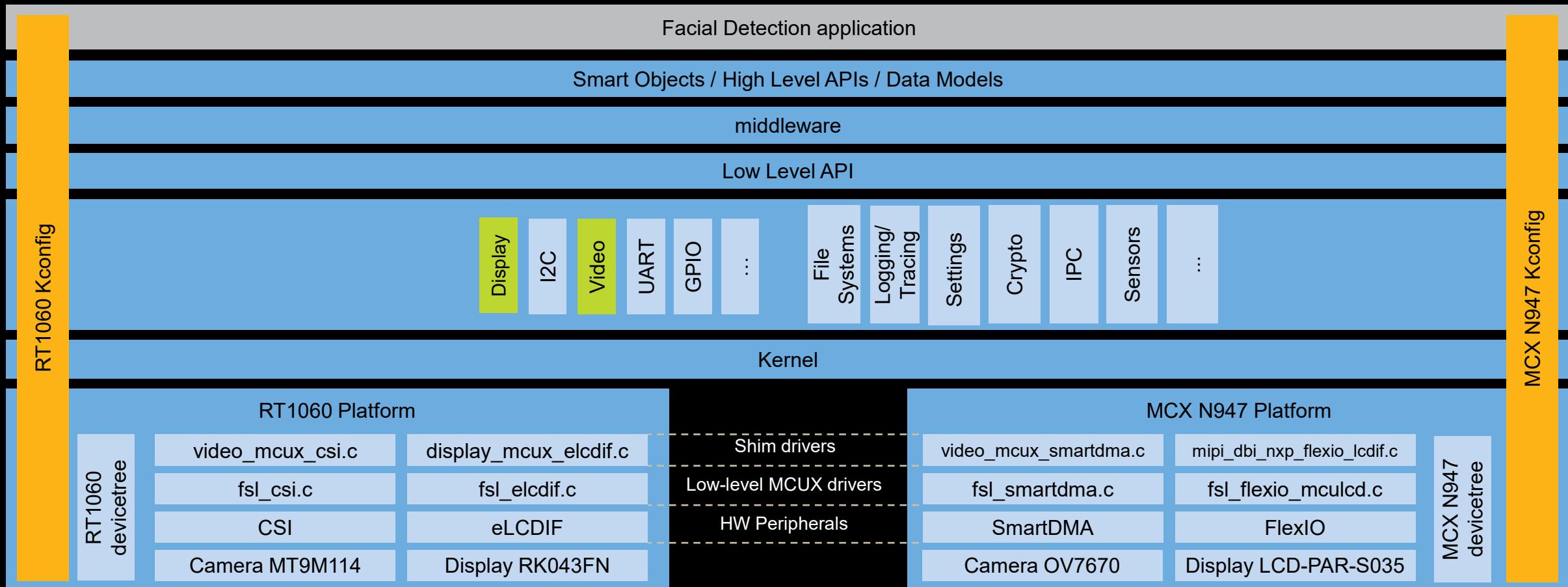
## MCX N series platform

- [FRDM-MCXN947](#)
- [NXP LCD-PAR-S035](#) Low-Cost display
- [Omnivision OV7670 Camera](#)



# Hardware Abstraction with devicetree and Kconfig

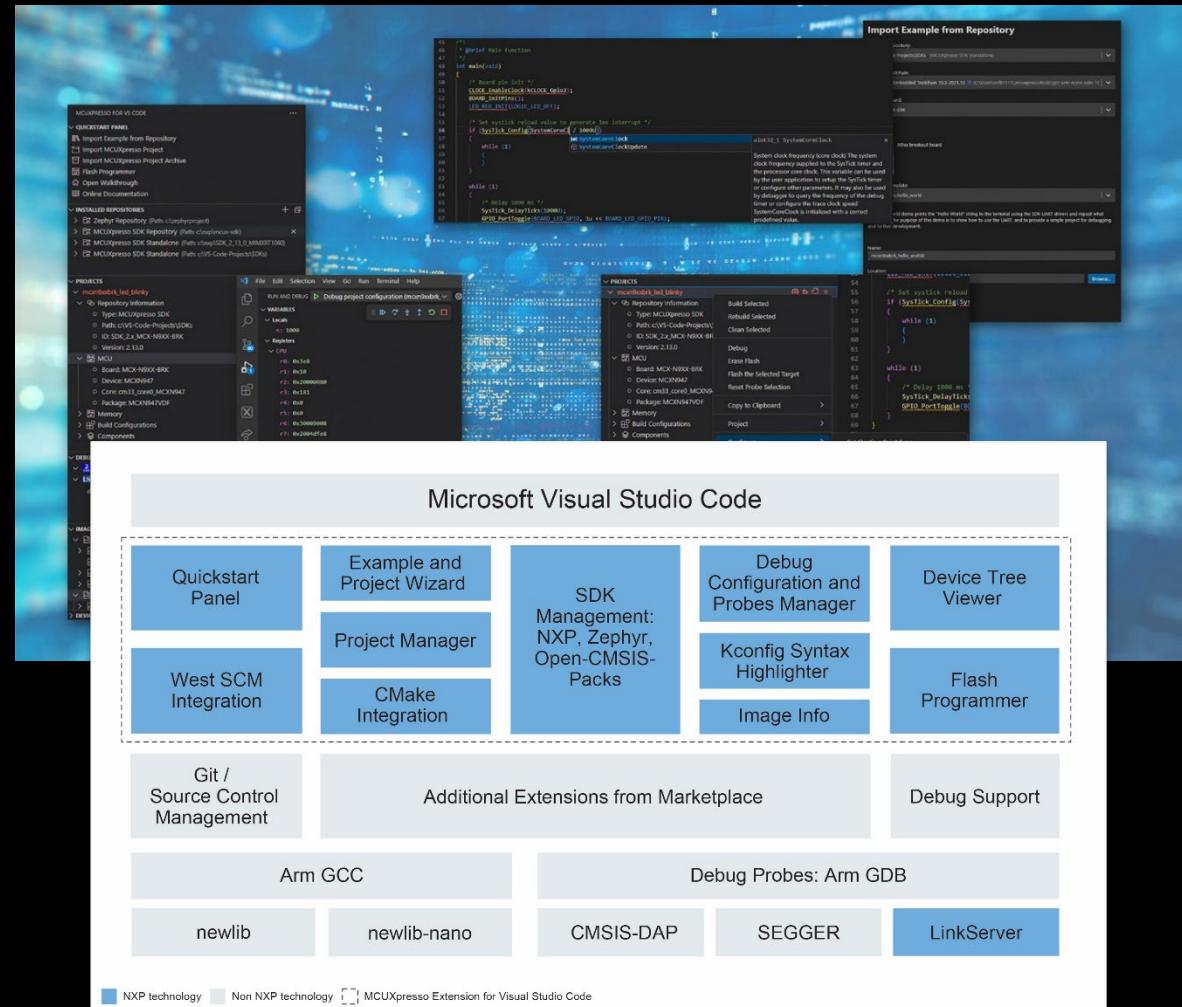
- Facial Detection application on both mimxrt1060\_evk and frdm\_mcxn947 boards
  - Same application, same kernel and upper layers, but different HAL controlled by device tree and Kconfig settings



# Developer Experience: MCUXpresso for VS Code

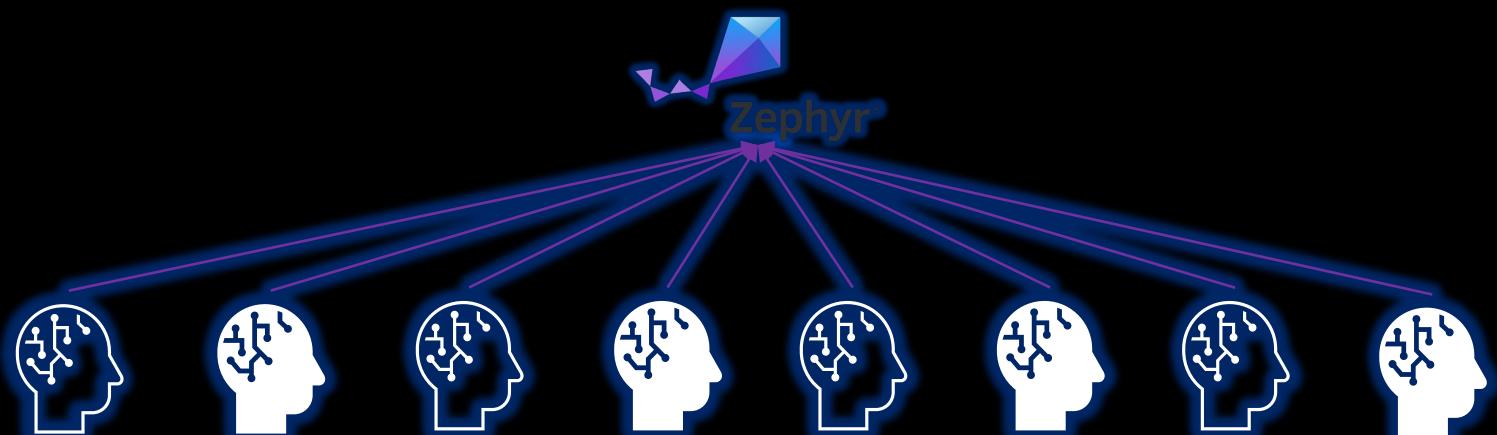
Recommended IDE choice for NXP Zephyr developers using MCUs

- NXP introduced MCUXpresso for VS Code in April 2023
- Features extended for both MCUXpresso SDK and **Zephyr** development flows
- Complemented by MCUXpresso Installer to simplify environment setup
- Compatible with NXP and Segger debug probes
- Planned: Further improvements for simplified device tree and Kconfig management



## Benefits of open source to NXP

- Technical debt reduction
  - Reduced investment in common middleware by shared community effort
- Collaboration for development of new features
  - More investment in areas where our silicon features intersect the need for new Zephyr capabilities
- Community support for improved customer experience
  - Burden of common questions shared across the project, higher chance of customers getting answers they need quickly



## How NXP is doubling down?

- Moving from incubator / demand driven model to mainstream support, with Zephyr enablement as standard
- Greater investment / engagement
- Changing development to GitHub centric approach to enable faster Zephyr support
- Aligning i.MX products and MCU products
- Investing more in developer experience







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