

arm TechCon +

# Introduction to Arm

Arm  
Chris Shore  
Director of Product Marketing

#ArmTechCon

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2019



# Welcome to **arm** TechCon 2019

“Over the past 15 years, Arm TechCon has become **the industry event** by engineers, for engineers, where attendees gather to hear about **new directions** in technology, to **network** and to **compare notes**. I’m thrilled you’re here and just as excited to be working with you as we think about what tomorrow looks like and then go about creating it.”

*Simon Segars, CEO Arm*

# Agenda

What does Arm do?

Arm from the outside

Foundational Arm compute technology

Chip-to-cloud IoT solutions

Development tools

The ecosystem

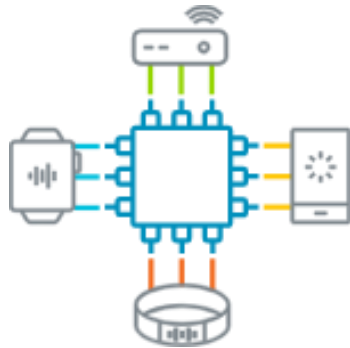
Where next...?

# What does Arm do?

We design

Our partners license those designs and incorporate them into silicon devices

We produce a lot of supporting technology

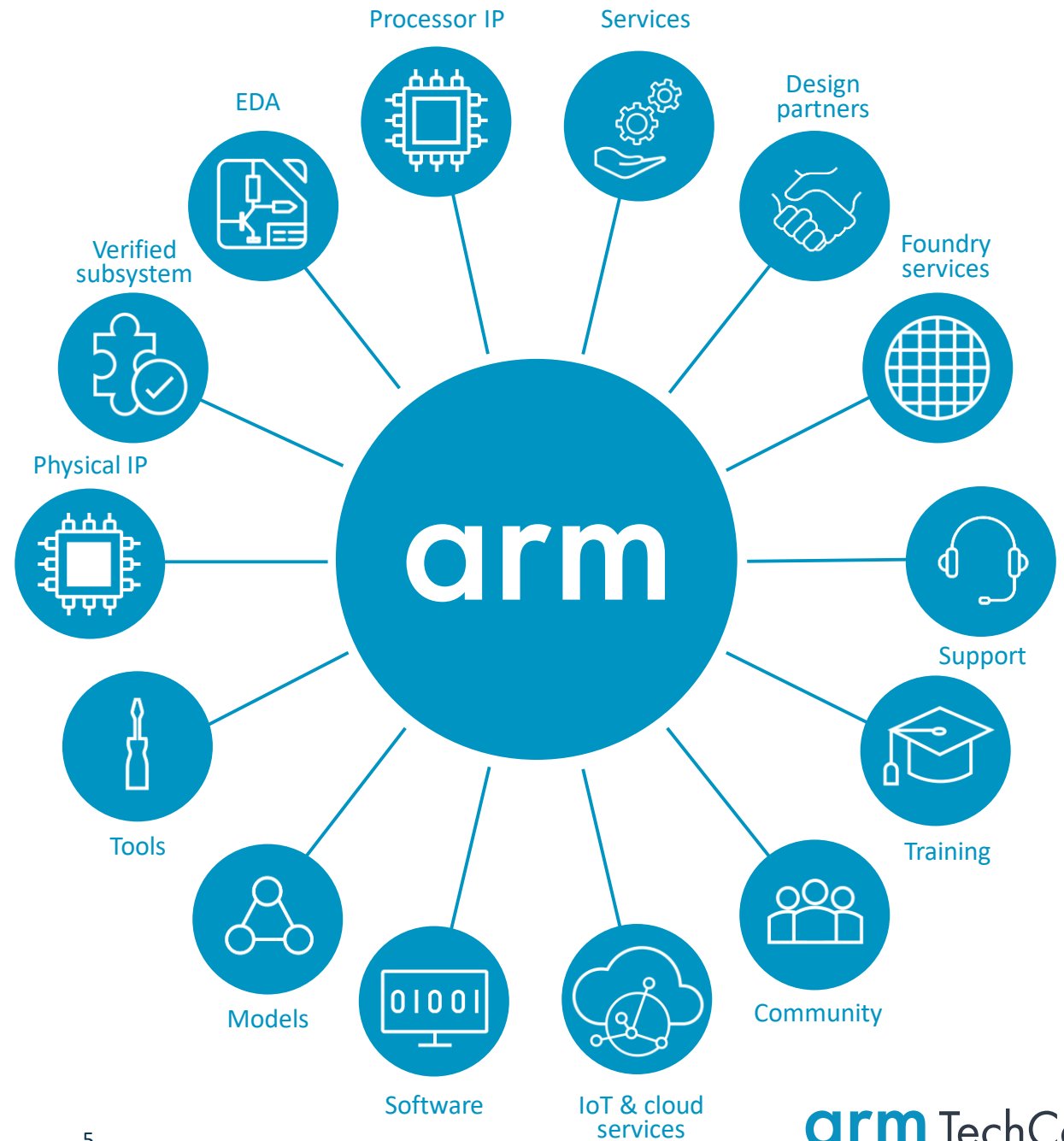


**Processor IP**  
**System IP, Services & Tools**

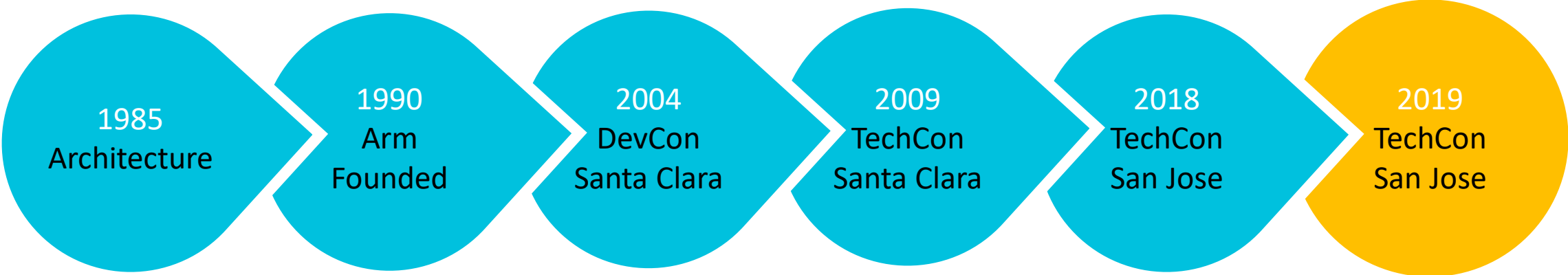


**IoT services**  
**(the Arm Pelion platform)**

# Much more than a CPU



# Happy 15<sup>th</sup> Birthday, TechCon!



# 2018 Headlines to 2019 Announcements

Arm announces Neoverse purpose-built IP for next-gen cloud to edge infrastructure *(Oct 2018)*

Arm launches Neoverse N1 and Neoverse E1 cores for cloud-to-edge infrastructure in the era of 5G *(Feb 2019)*

AWS announces availability of Arm Neoverse based application services *(Nov 2018)*

Arm announces new flagship IP and safety program for automotive *(Sept 2018)*

Arm announces Cortex-A65AE – first multi-threaded processor with integrated safety *(Dec 2018)*

Arm acquires Treasure Data to set the stage for IoT transformation *(Aug 2018)*

Arm deploys Space Analytics as part of Pelion Smart Spaces solutions *(May 2019)*

Pelion Connectivity Management 2.0 brings advanced automation to scale IoT *(Aug 2019)*

# 2019 Headlines

Arm Enables Custom Instructions for CPUs

Arm Announces Extension of Platform Security Architecture for the Infrastructure Market

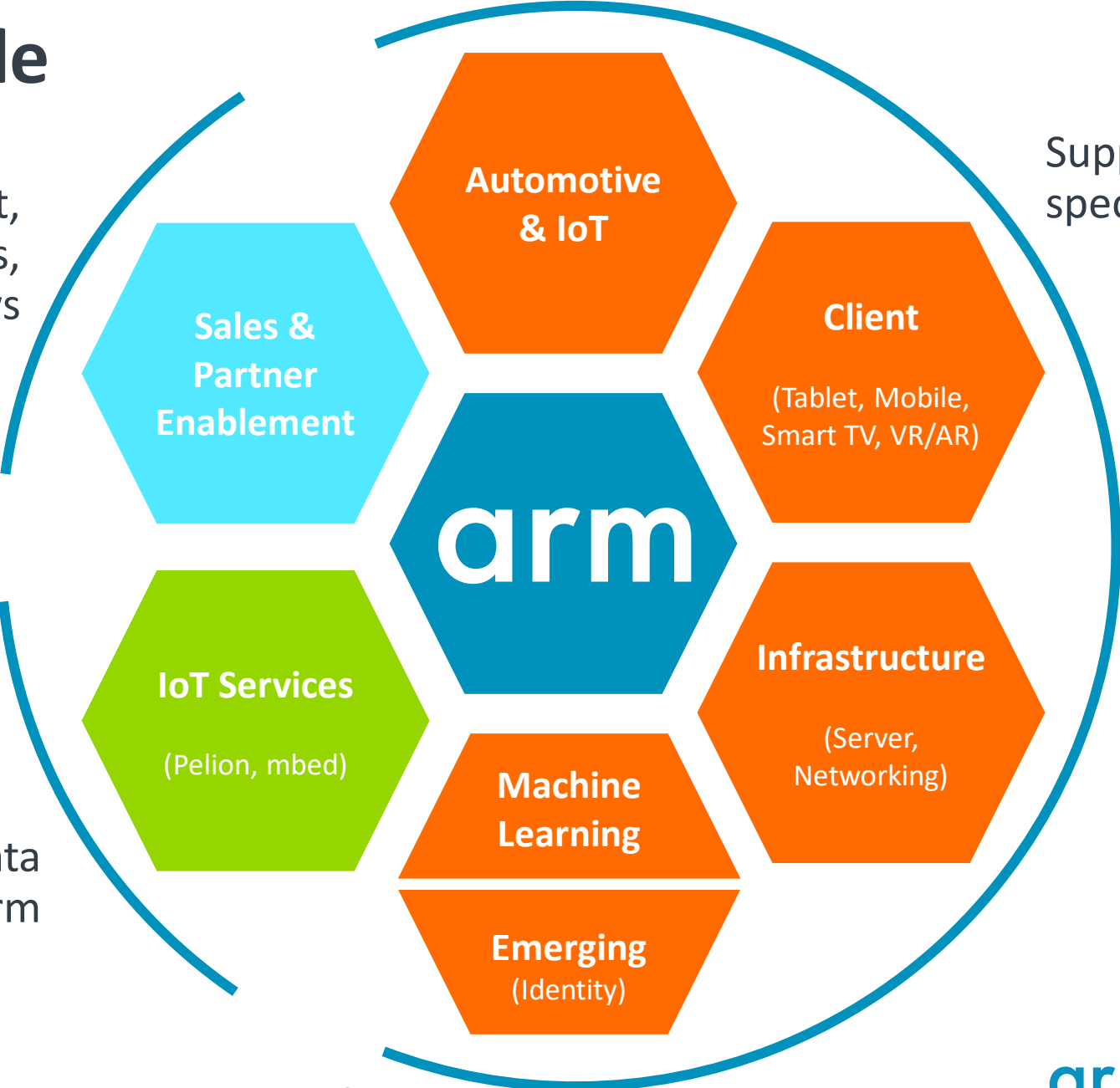
Arm is a Founding Member of the Autonomous Vehicle Computing Consortium

Arm Announces Partnership with Unity

Find out more  
about all of these  
right here at  
TechCon 2019!

# Arm from the outside

Sales, support,  
training, tools,  
design reviews

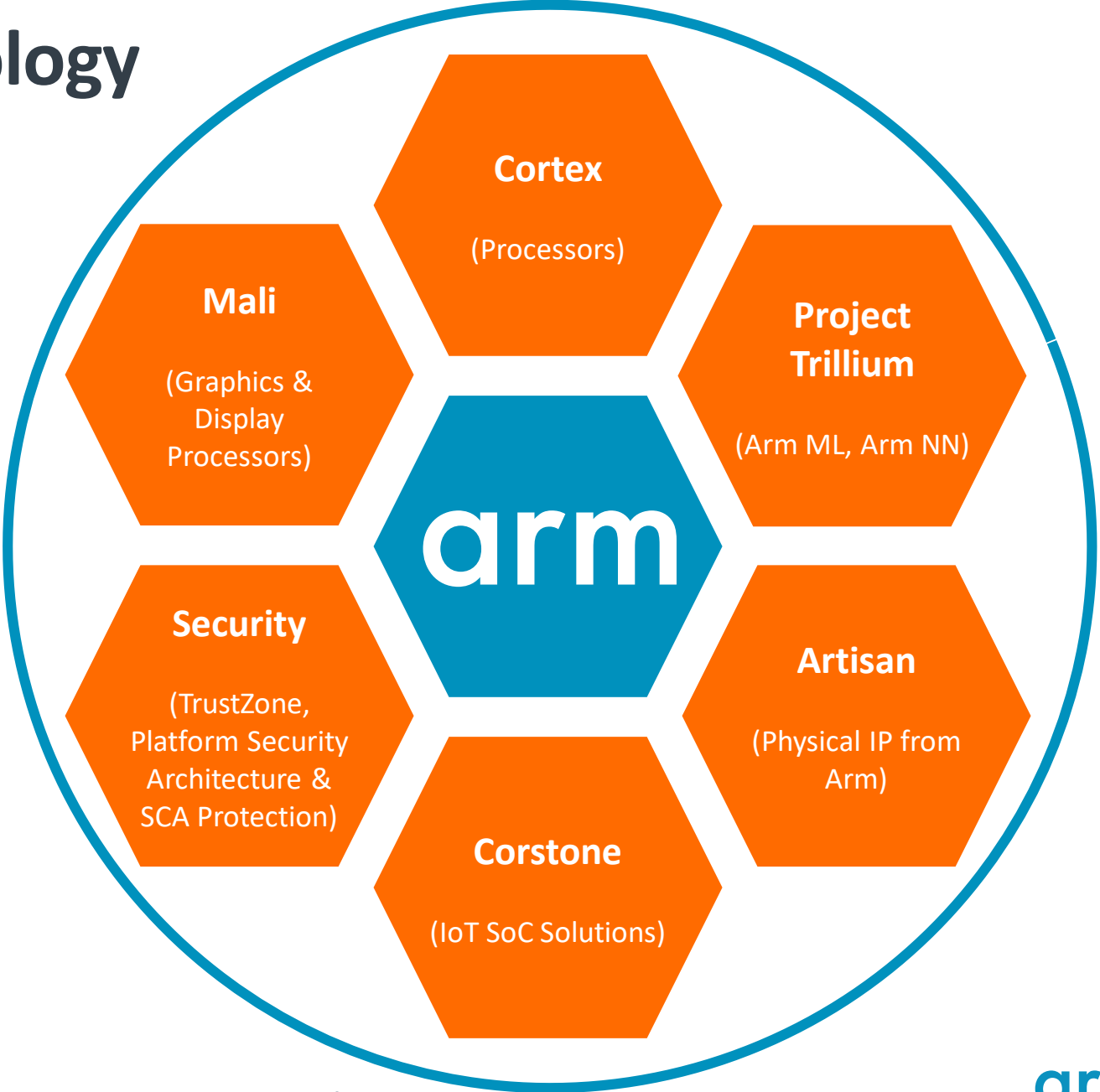


Supplying IP to  
specific markets

Device-to-Data  
IoT Platform

# Foundational technology

## Foundational Arm Compute Technology



# Foundational Compute Technology

#ArmTechCon

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# Diverse Applications Need Diverse Compute



## High performance

Platform OS, rich user experience

Cortex-A



## Hard real-time

Deterministic responsiveness

Cortex-R



## Low-power

Always-on efficiency

Cortex-M

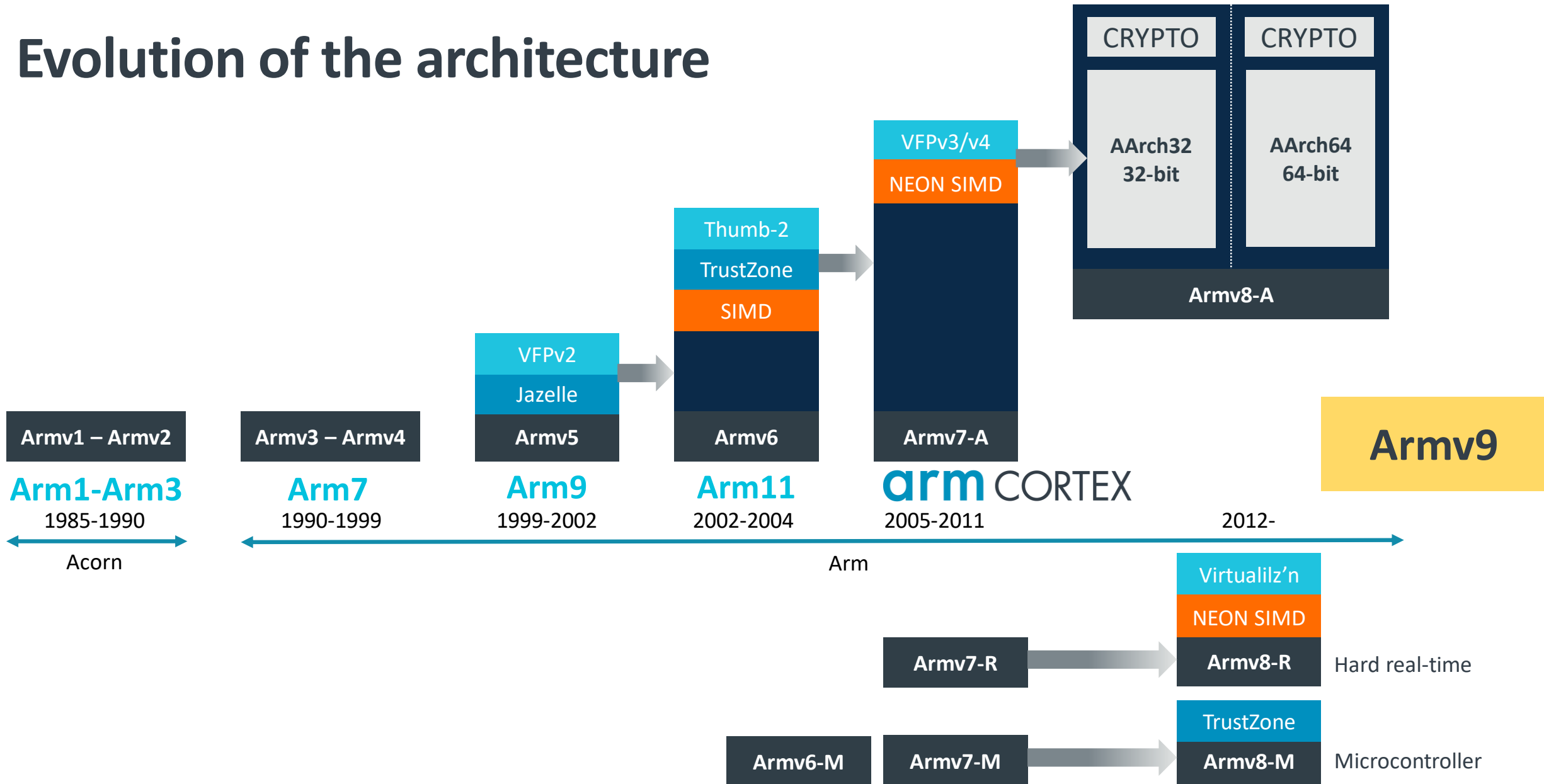


## Infrastructure foundation

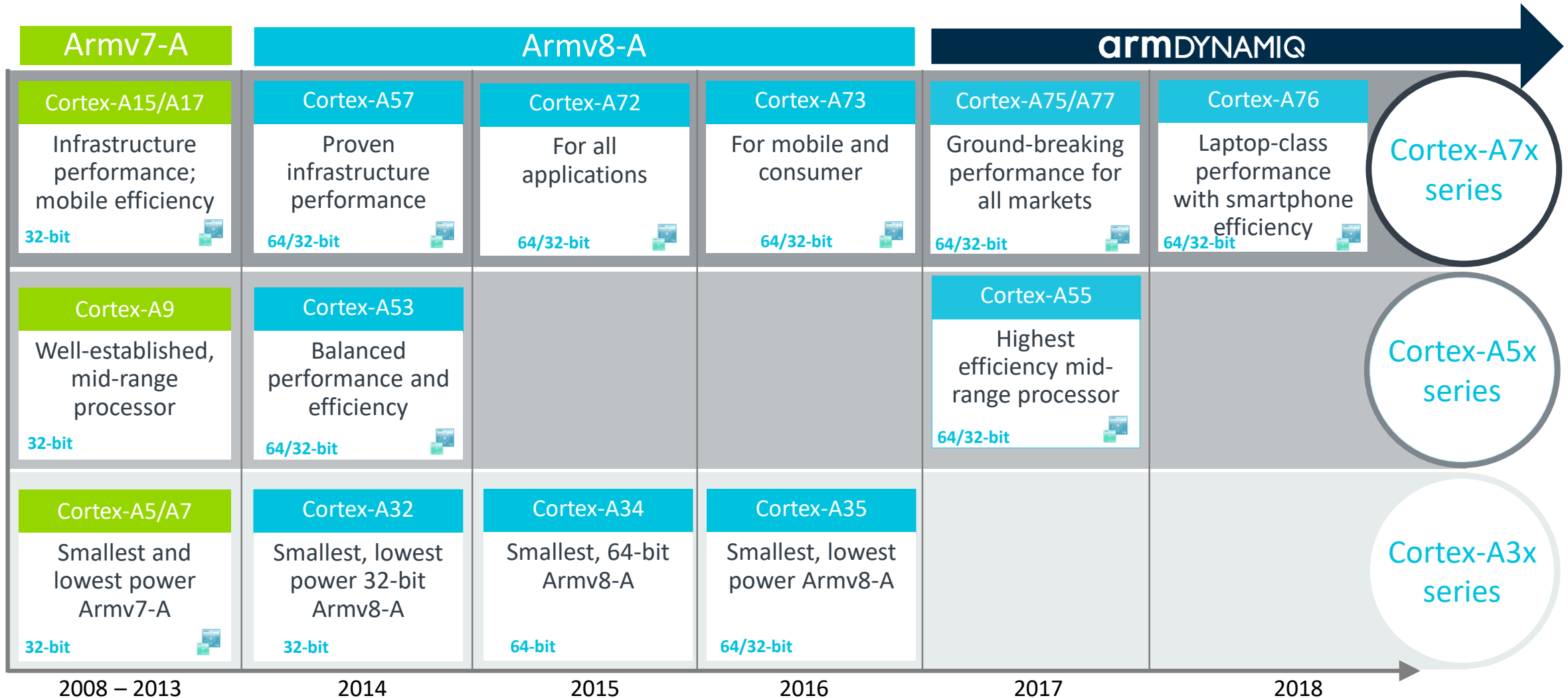
Scalable from hyperscale to edge of the network

Neoverse

# Evolution of the architecture



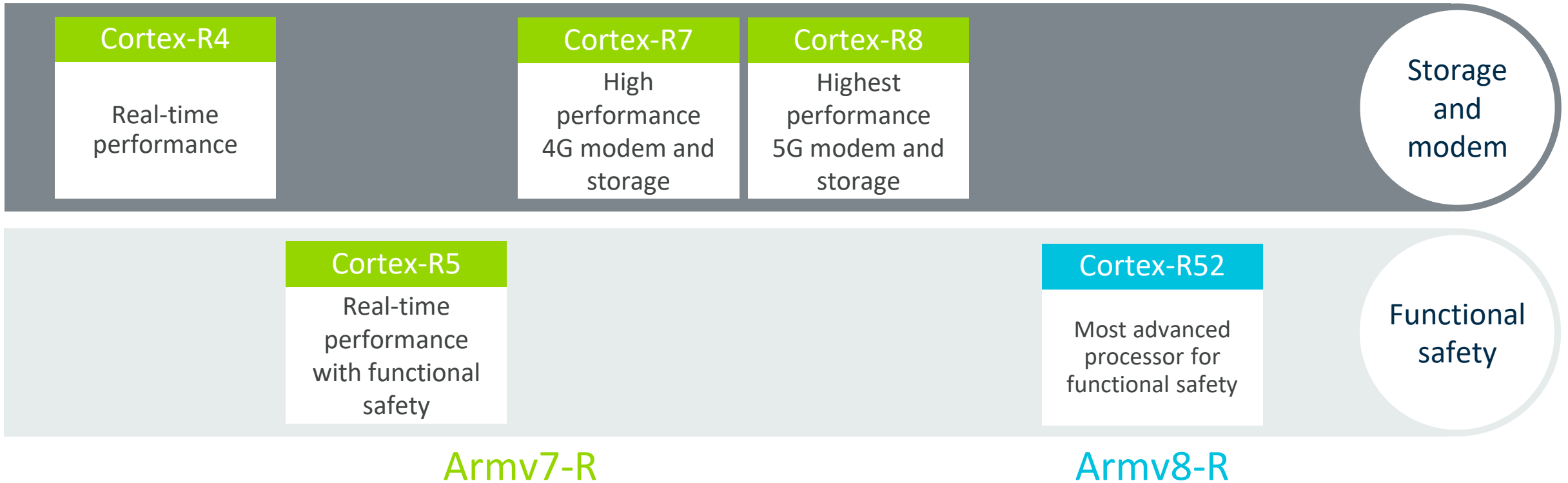
# Arm Cortex-A portfolio



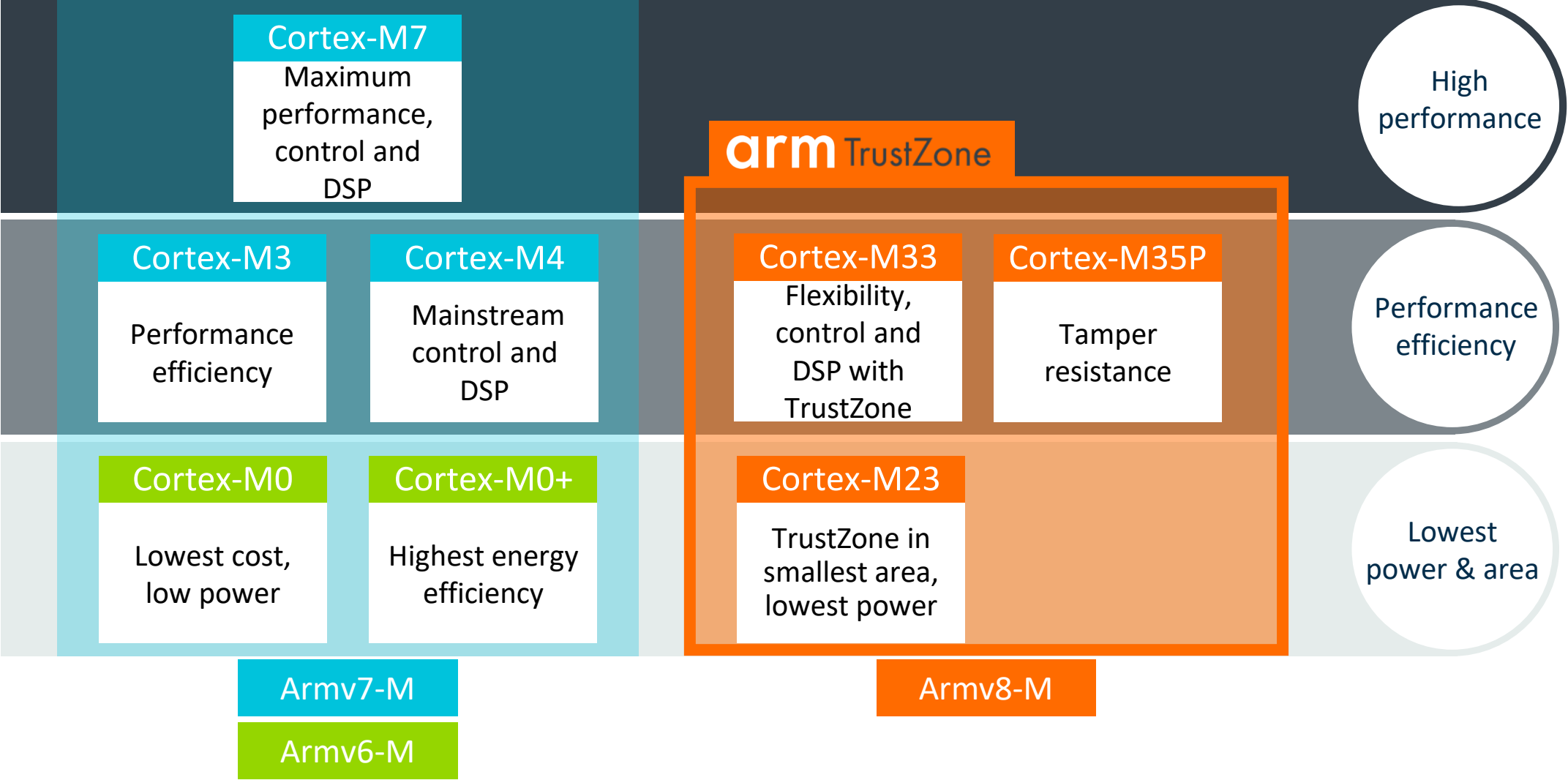
 Arm big.LITTLE compatible

Year of IP release, volume devices in the subsequent year

# Arm Cortex-R portfolio



# Arm Cortex-M portfolio



# Security IP from Arm

## Physical

- Invasive & non-invasive

## Software

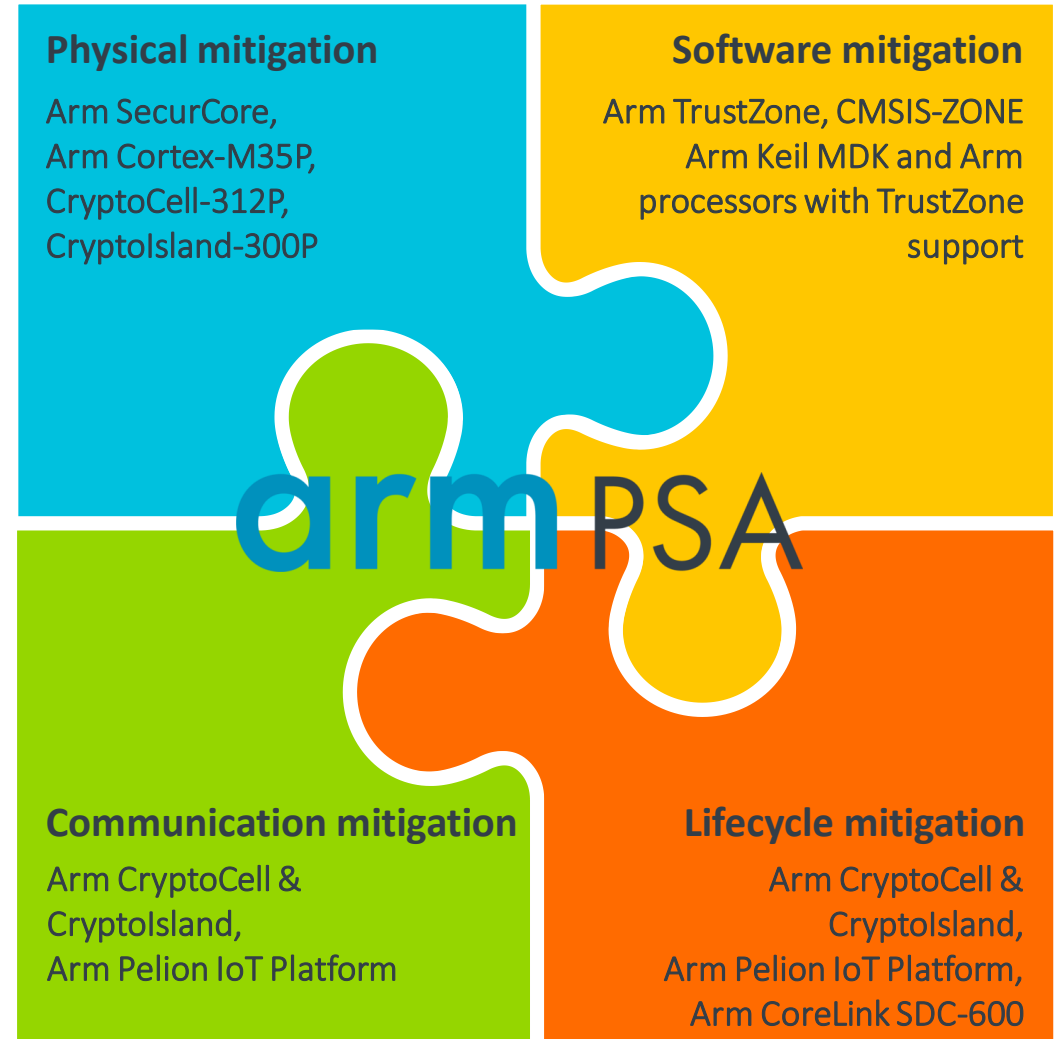
- Buffer overflow, interrupts, malware etc.

## Communication

- Man-in-the-middle, weak RNG, code vulnerability

## Lifecycle

- Code downgrade, ownership change, over-production, debug attack



# Tailored solutions for secure IoT devices

## arm CORSTONE

### Flexible processor choice

- Multicore and heterogenous options

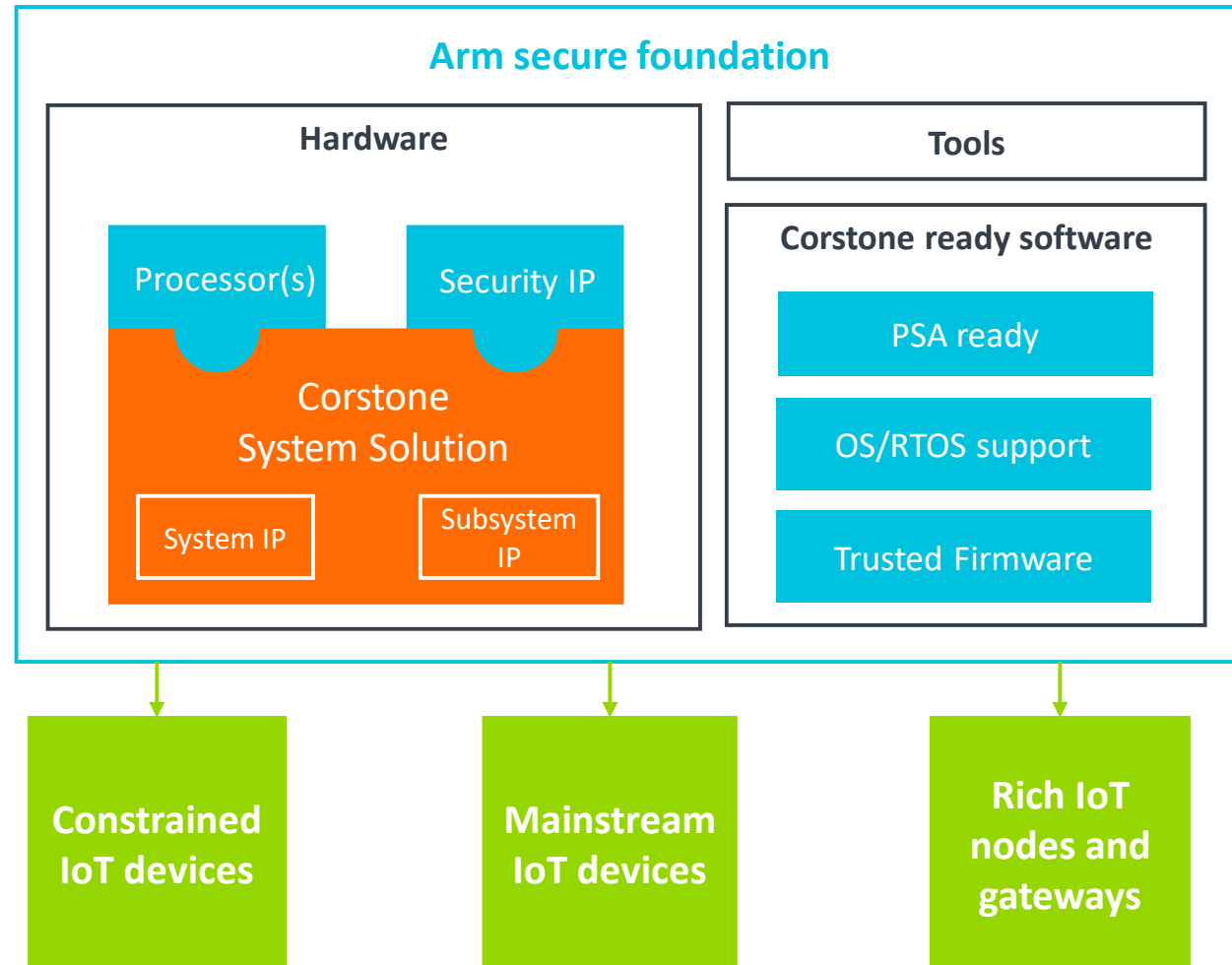
### Optional security IP

- TRNG
- RTC
- Cryptographic acceleration
- Key management

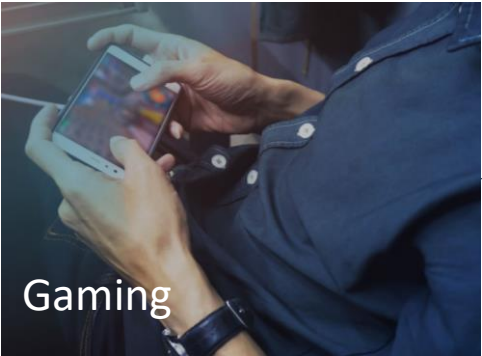
### On-chip SRAM

### TrustZone-aware fabric

### Readily-available software



# Arm Mali GPUs: The World's #1 Shipping Graphics Processor



+



Over **1Bn**  
Mali GPUs shipped in 2018



Mali GPUs are in:

+

**~80%**  
SmartTVs

+

**~50%**  
Smartphones

+

**~50%**  
Mobile VR

Total Mali licenses

**183**

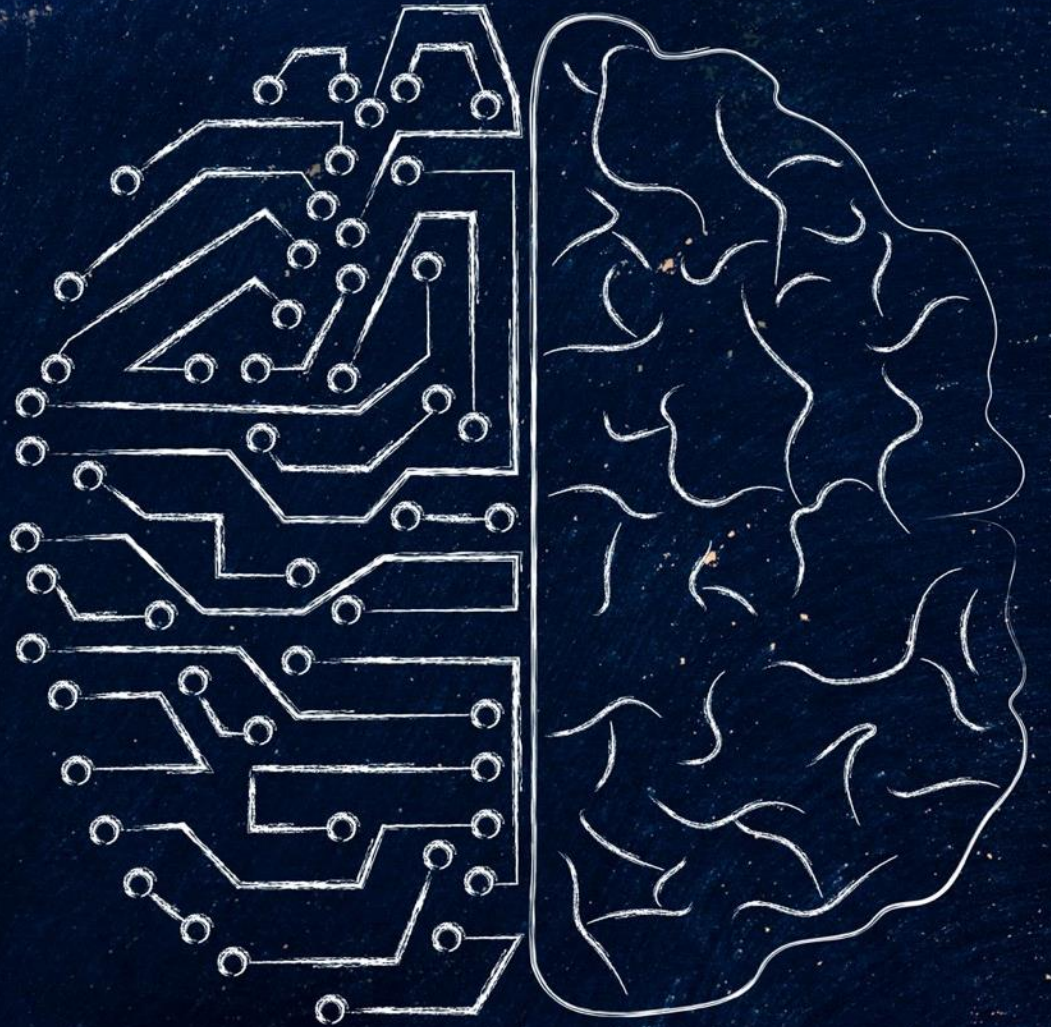
# Project Trillium: Arm ML for all devices

Suite of Arm machine learning IP, designed for unmatched versatility and scalability

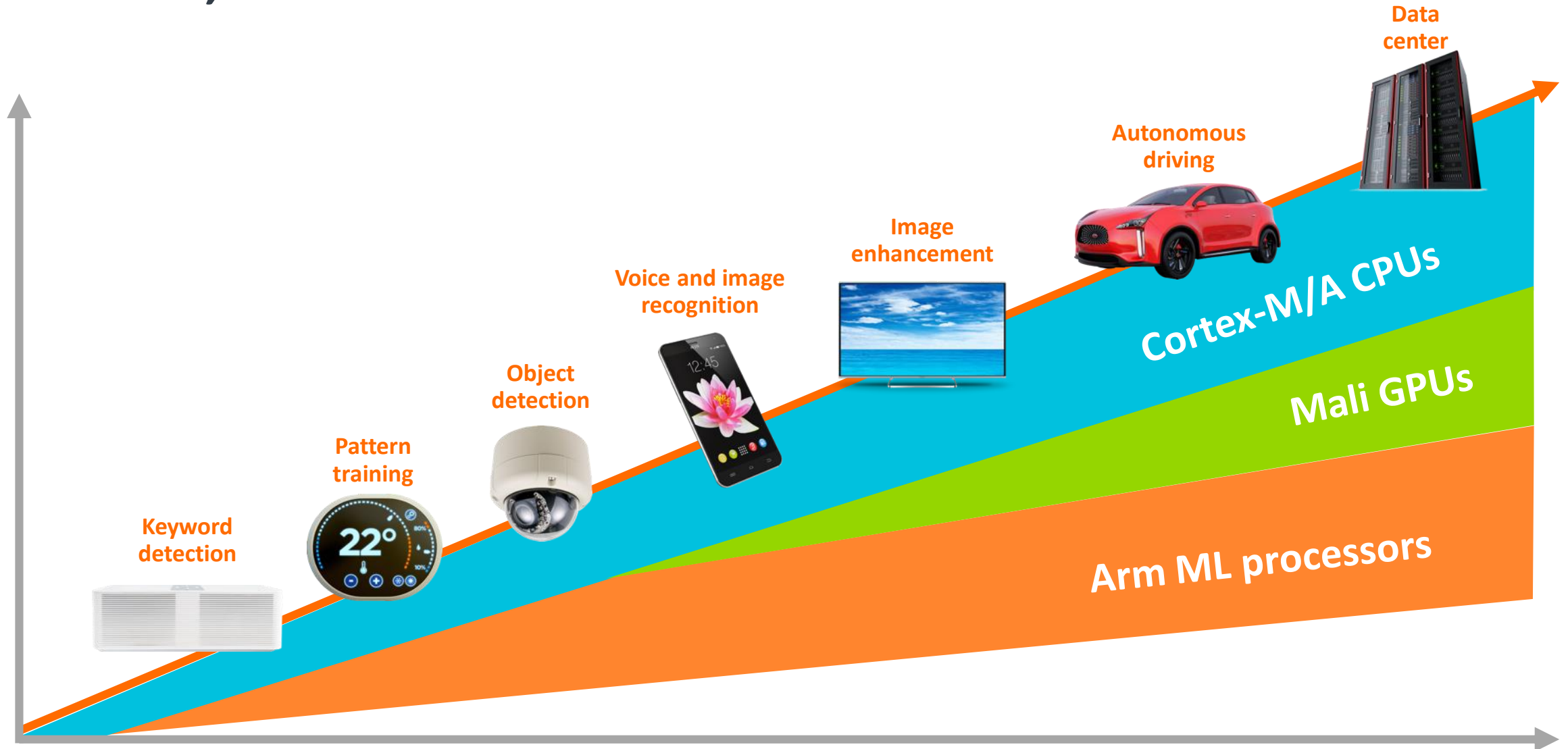
- Machine Learning (ML) processor
- Neural Network (NN) software libraries with Arm NN

An addition to the existing ML capabilities of:

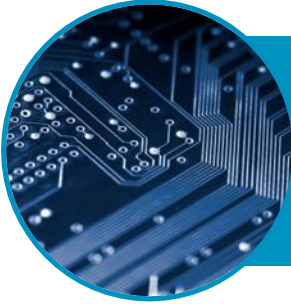
- Cortex-A CPUs with Neon
- Cortex-M CPUs (with Helium)
- Mali GPUs



# Flexible, scalable ML solutions



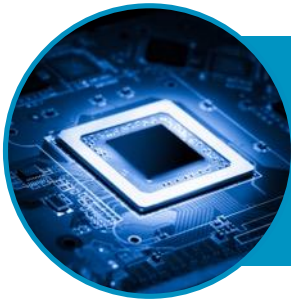
# Speed up SoC implementation with Arm Artisan physical IP



The leading supplier of physical IP and processor implementation solutions



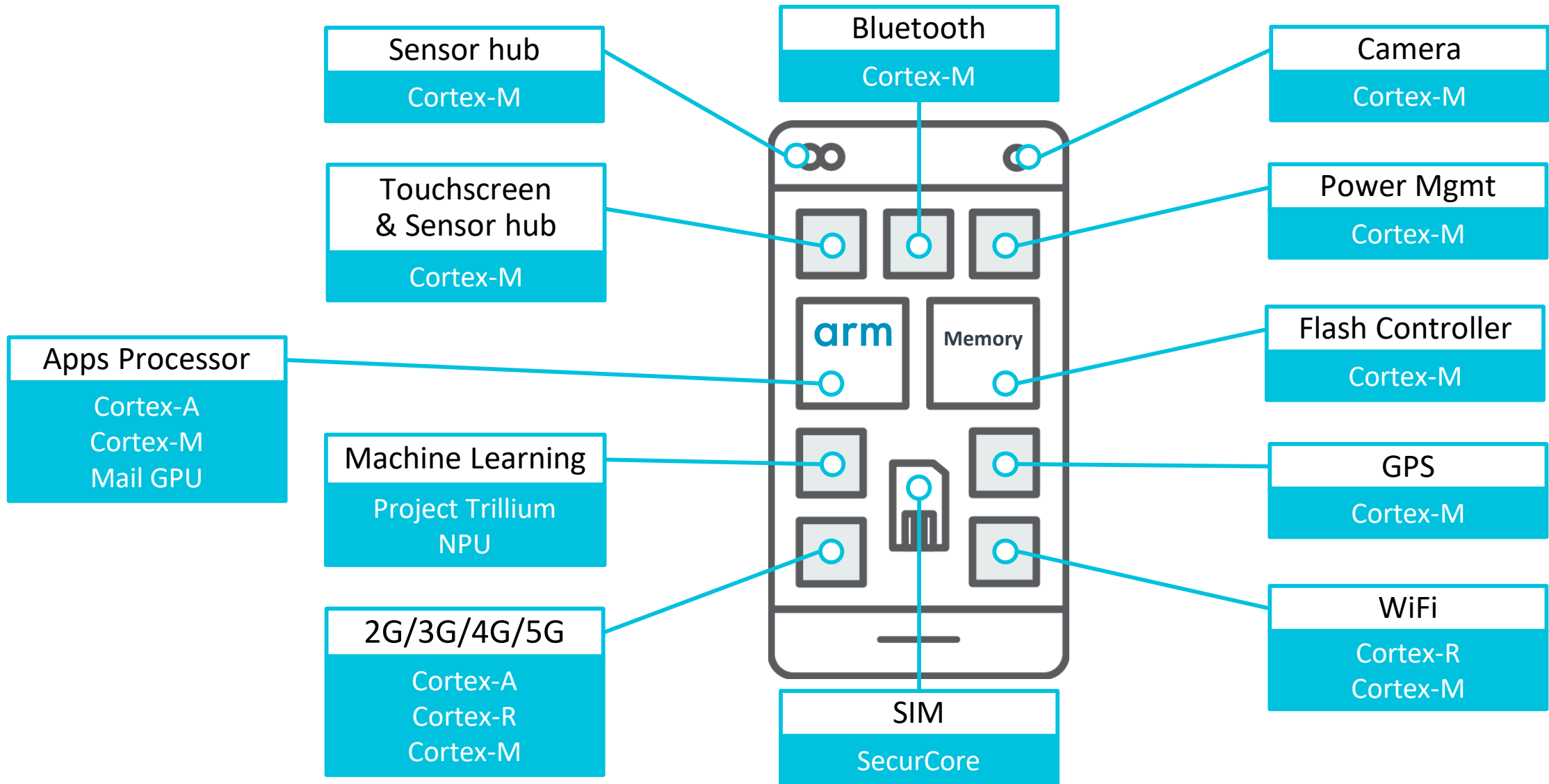
Support for 18 foundry partners



Most trusted and widely-used implementation IP > 10 billion SoC shipped annually

- Web based registration and access to the most comprehensive physical IP library
- Browse the Artisan physical IP library and choose the right solution
- Logic IP, Standard Cell, Embedded Memory Compilers, Interface IP and POP IP
- No upfront fees

# It's all about choosing the right combination...



# Arm processors for automotive

## Vision ADAS

Cortex-A55 + Cortex-R52 + Arm ML

Heterogeneous multi-core  
Computer Vision  
Control

## Navigation & infotainment

Cortex-A76AE + Cortex-A55 + Mali G51

Energy-aware scheduling  
Rich OS  
Security

## Other modules

V2X

Chassis

Security

Radar

Sensor

Audio

Networks

## Powertrain

Cortex-R52

Real time  
Homogeneous multi-core

## Autonomous driving

Cortex-A65AE + Mali G76 + Mali-C71 + Cortex-R52 + Arm ML

High performance multi-cluster  
Machine Learning  
Functional safety

## Central body control

Cortex-M7, Cortex-M23

Low power  
Efficient performance  
Scalable



# Want to do your own chip? Speed up access to Arm IP

## arm DESIGNSTART

### DesignStart for custom SoCs/ASICs

- ✓ Cortex-M0, Cortex-M3, Cortex-A5
- ✓ Over 5,000 CPU prototyping downloads to date!
- ✓ License for \$0 upfront (\$75k for Cortex-A5)

### DesignStart FPGA

- ✓ Cortex-M1 and Cortex-M3 CPUs
- ✓ Soft IP FPGA from Xilinx/Gowin
- ✓ No license fee, no royalties

Get started today: [DesignStart.arm.com](https://DesignStart.arm.com)

# Chip-to-cloud IoT solutions

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# Arm's end-to-end product offering

From chip to cloud, securely

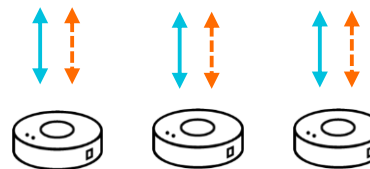


# End-to-end Pelion IoT platform overview

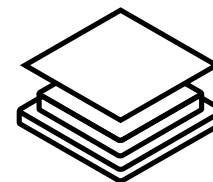
**arm PELION**  
IOT PLATFORM

**arm MBED OS**

**arm CORSTONE**



Device Ecosystem



# Comprehensive Development Tools

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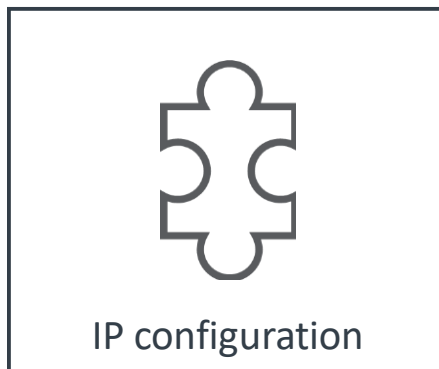
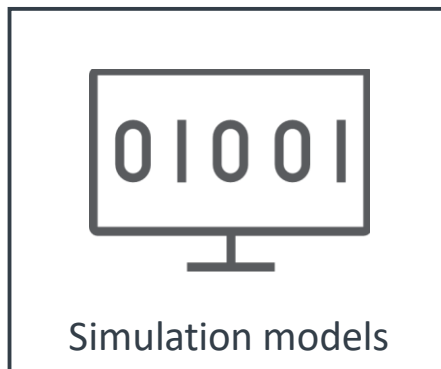
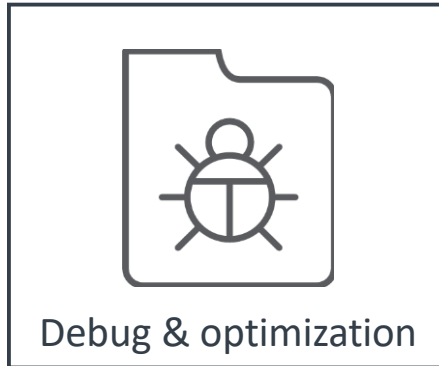
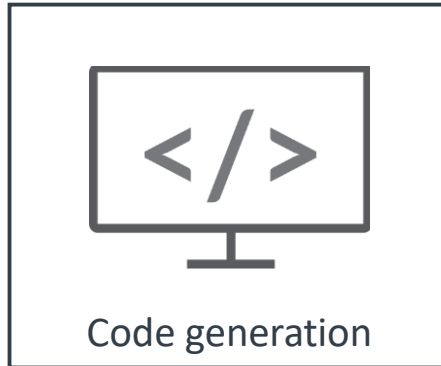
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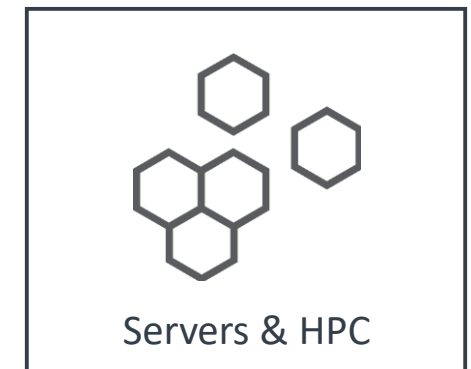
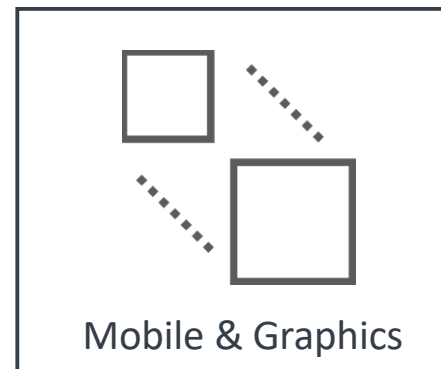
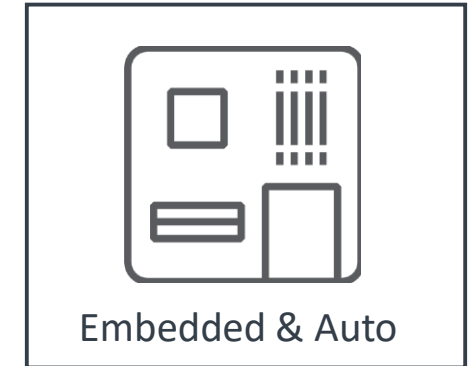
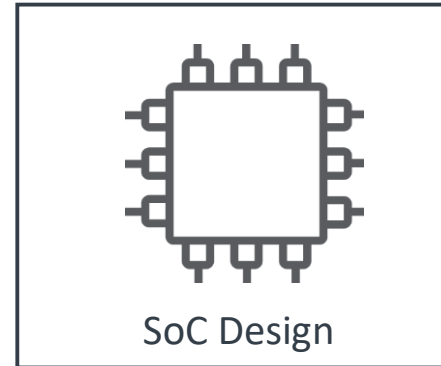
# Arm development solutions

Engineering tools developed by the architecture experts

## Technologies



## Solutions



# Arm tools

Accelerate product development from SoC architecture to software development

## SoC Design

**arm** CYCLE MODELS  
Cycle-accurate models

**arm** SOCRATES  
Convenient graphical system design

**arm** FAST MODELS  
Programmer's view models

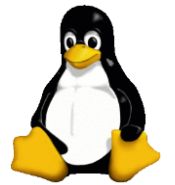
**arm** DEVELOPMENT STUDIO  
Complete tool suite

## Mobile

**arm** FAST MODELS  
Fast and accurate programmer's view models

**arm** DEVELOPMENT STUDIO  
System level performance analysis

**arm** COMPUTE LIBRARY  
Optimized performance libraries



## Server and HPC

**arm** ALLINEA STUDIO  
Complete tool suite for Arm-based HPC

- Arm Compiler
- Arm Performance Libraries
- Arm DDT Debugger
- Arm MAP performance analyser
- Arm Performance Reports

**You are not alone...**

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# Arm ecosystem: choice, diversity and innovation

## Silicon



## Design support



## Software and training



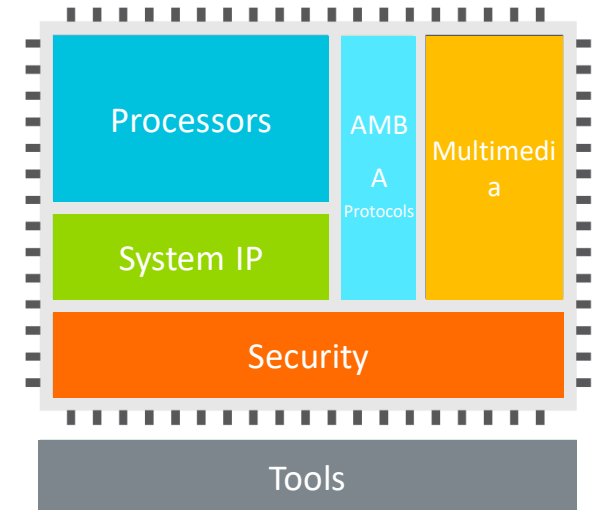
community.arm.com

# Arm Training Overview

Arm Training gets partner teams up to speed quickly

- Detailed training across all Arm Products
- Covers advanced technologies such as Arm<sup>®</sup> DynamIQ, Arm<sup>®</sup> CryptoCell and Arm<sup>®</sup> TrustZone<sup>®</sup>

Delivered by senior Arm engineers in a way that works best for you and your team



## Face to face courses

Delivered by experienced Arm trainers at a location of your choice  
Private courses can be customizable to meet your specific needs



## Virtual classroom

Delivered by an experienced Arm trainer  
Private and public courses available  
Delivered to you, wherever you are at a scheduled date and time



## Online training

Short topics accessible wherever you are and whenever you need them.

# Arm Approved Design Partners



- 💡 Global network of design service companies with demonstrable success using Arm IP
- 💡 Faster time to market by using expert engineering teams who are supported by Arm
- 💡 Audited by Arm, giving confidence in their processes, quality standards & financial stability

INOMIZE

**NSW**  
日本システムウェア株式会社  
NIPPON SYSTEMWARE CO., LTD.

**EnSilica**  
your trusted IC partner

**Easy iC**

**ELSYS**  
EASTERN EUROPE

**Adesto**

**sondrel**  
Success through partnership

**argo**  
Semiconductor • Service

**ICALPS**

**BLACK PEPPER**

**ADT** Advanced Design Technology

**ASICLAND**

**SERMA**  
ID MOS

**SILVACO**

**hdl** Design House  
SoC Design and Verification Company

**CREATIVECHIPS**<sup>®</sup>  
MICROELECTRONICS

**Dream CHIP**

**AVNET**  
Reach Further™

**Cambridge Consultants**

**AnSem**  
Innovation on chip  
A CYIENT COMPANY

**ASICSOLUTIONS**

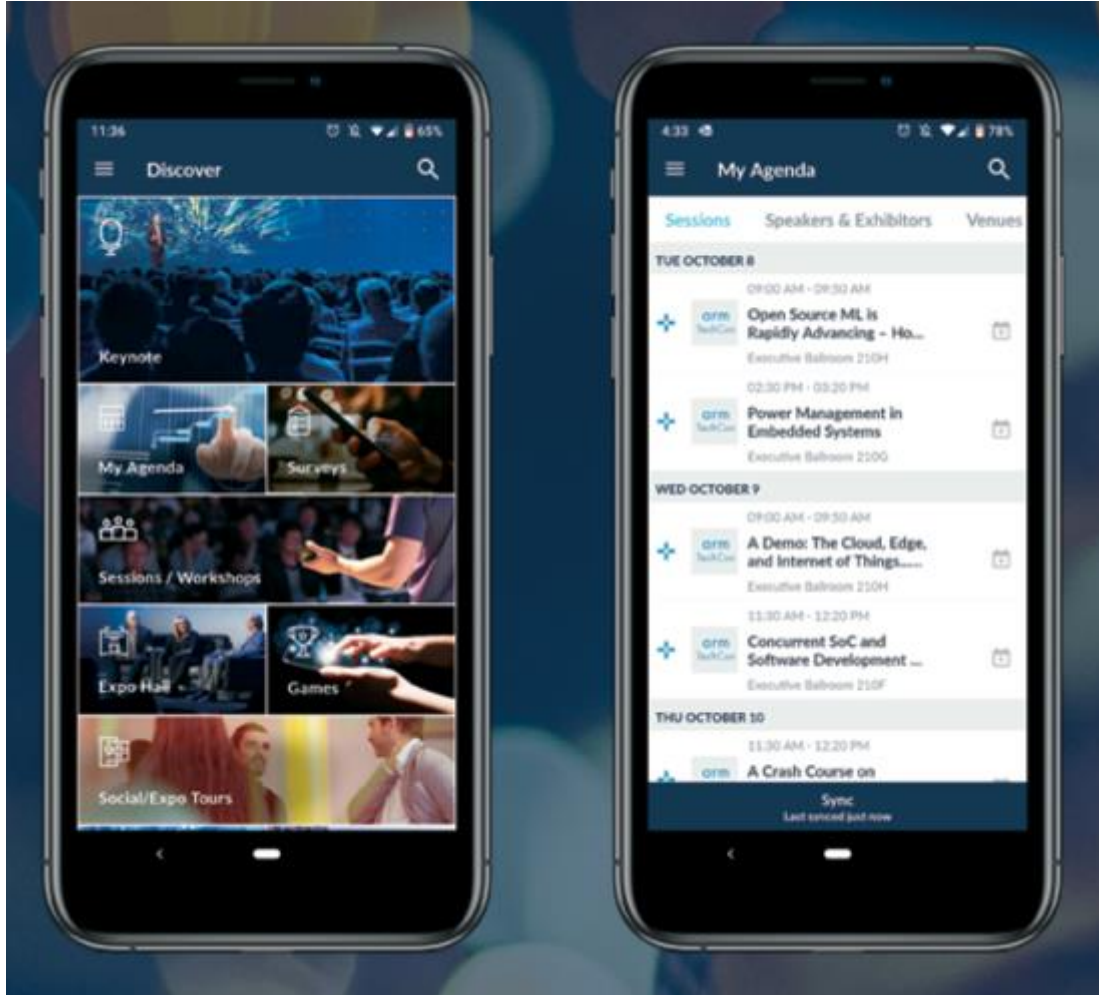
# Where next...?

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Passport game!



# The pick of the Arm Sessions

## Wednesday

### **The Platform Security Architecture APIs**

Suresh Marisetty, 1330

### **Building a Low-powered Arm Voice Assistance with Google TensorFlow Lite (Workshop)**

Peter Warden, Alessandro Grande, Wei Xiao, 1330

### **Pushing 3GHz of Arm Neoverse N1 CPU with Cadence Digital Flow**

Rob Christie & Paddy Mamtora, 1430

### **Accelerating Deployment of of a Secure Arm IoT Platform for Azure Sphere**

Lionel Belnet, 1530

## Thursday

### **A Crash Course in Cortex-M System Design**

Joseph Yiu, 1130

### **Next Generation Open Source Computing Libraries for Arm Cortex-M Processors**

Laurent Le Faucheur, 0900

### **Optimizing Deep Learning for Applications on Microcontrollers**

Rob Elliott, 1130

### **A Voice Trigger Using a Low Power Processor**

Laurent Le Faucheur, 1430

### **Top Design & Implementation Mistakes and How to Avoid Them**

Luke Dare, 1430

# Don't forget to network



## “Bots and Beer”

5pm Wednesday



## Charging Lounge

All Day

## Expo Tours

3.30pm Daily



## AI Coffee Lounge

All Day



## Women in Tech Reception

6pm Wednesday

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and  
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