Making progress vs strategy

Ian Thornton, Head of Investor Relations

Arm is a subsidiary of SoftBank

arm

Arm update

Arm refresher

H1 update – Increasing revenues and investments

Progress vs strategy

- Arm in servers
- AI at the edge
- Autonomous vehicles

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ARM overview

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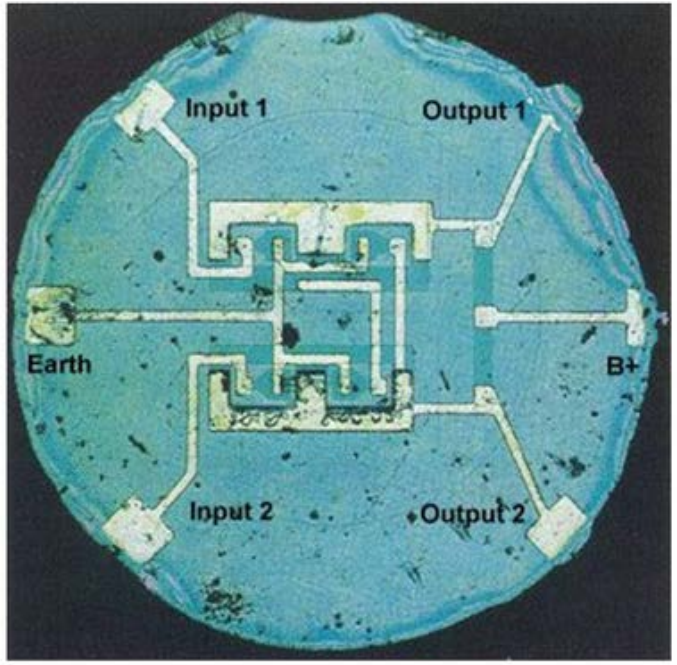
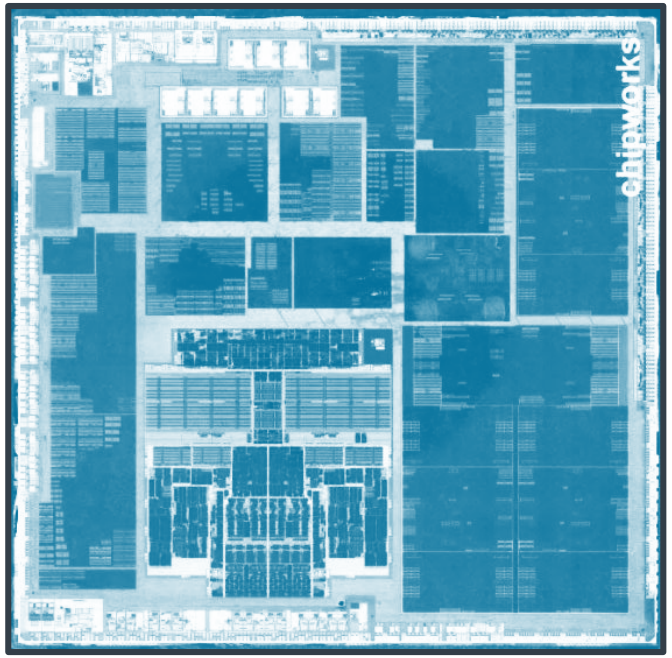
Chip design – then and now

1961



Four transistors
One engineer

Today



Two billion transistors
Thousands of engineers

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A system-on-chip contains multiple blocks of IP

Main processor for running the operating system, applications and user interface

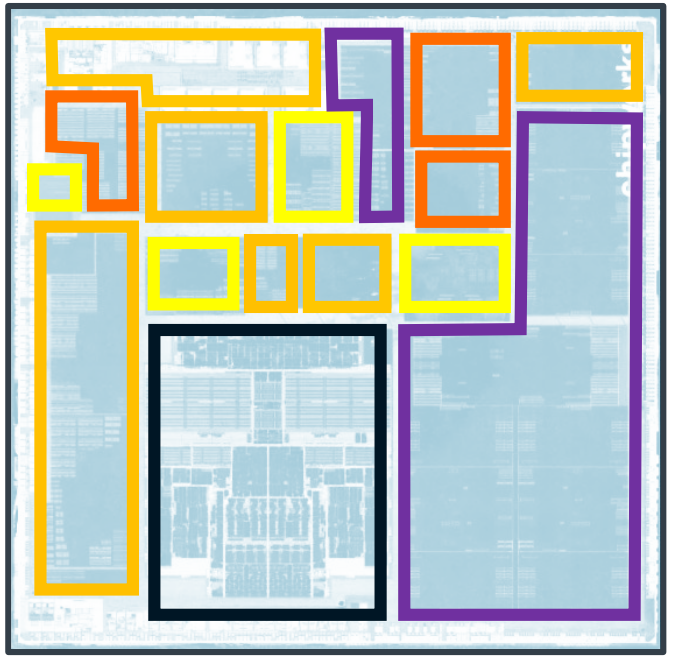
Graphics processor for generating images

Accelerators for frequently-used compute workloads, e.g. image processing, encryption, vision

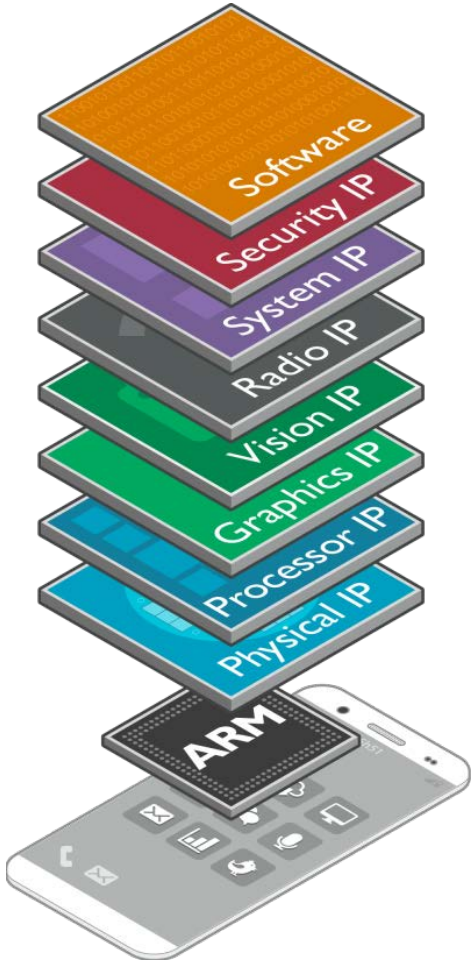
Radio controllers for mobile, wifi, Bluetooth, GPS

Hardware controllers for the display, memory, image sensors, power supply, etc

Input/Output interfaces for USB, Ethernet, etc



ARM's current business



ARM develops **intellectual property** (IP) blocks which are used in silicon chips

Our partners combine ARM IP with their own IP to create complete chip designs

We earn **license fees** when we deliver ARM IP to our partners and **royalties** when our partners ship chips that contain ARM IP

Highly **profitable** and **cash generative**

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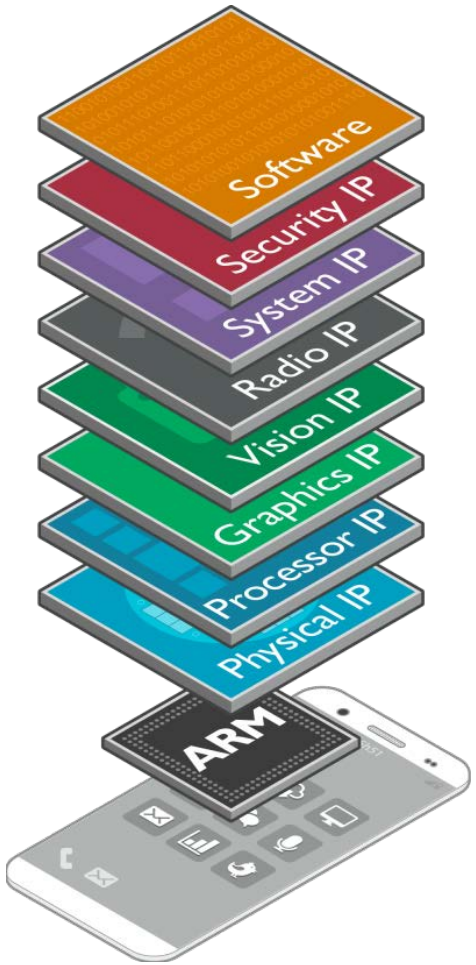
Accelerating investment to increase share gains

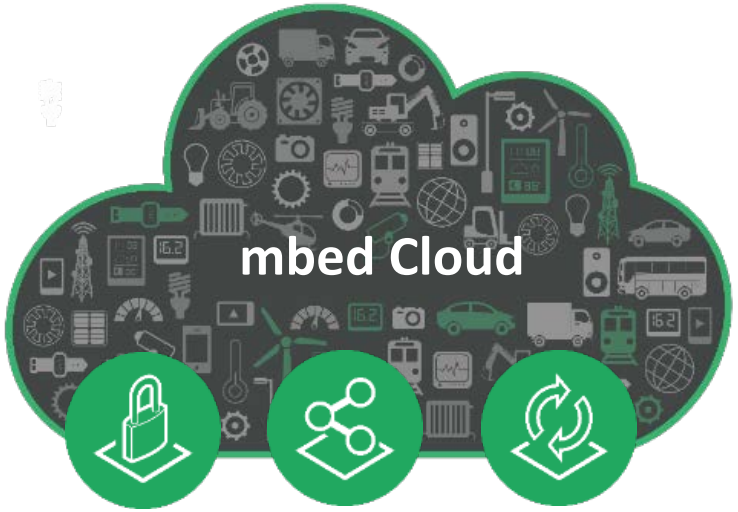


Generating

$500m

free cash flow (2017 forecast) and growing

Investing to create new revenue streams



mbed Cloud Partners

ADVANTECH TOSHIBA

ZEBRA GE Lighting

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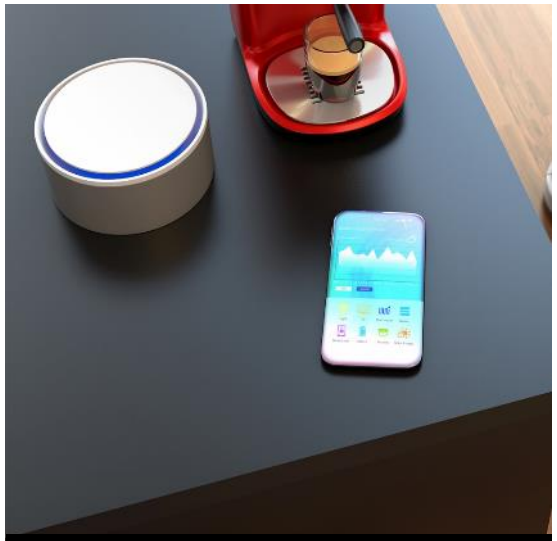
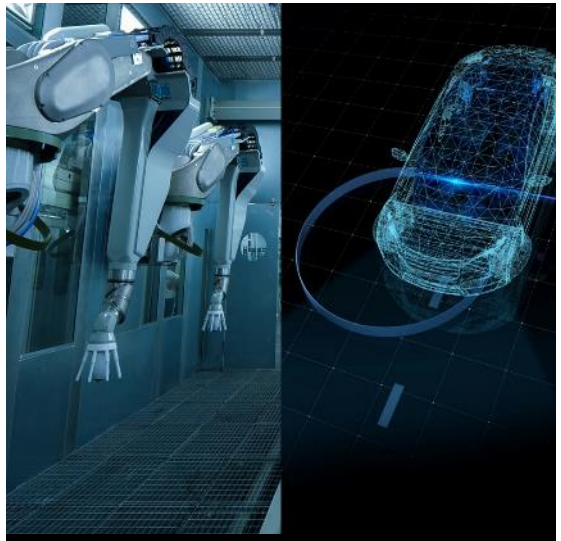
Technology trends that will redefine all industries



Artificial Intelligence in every device



Autonomous machines

Augmented reality

Hyperscale cloud and connectivity

Security and Privacy

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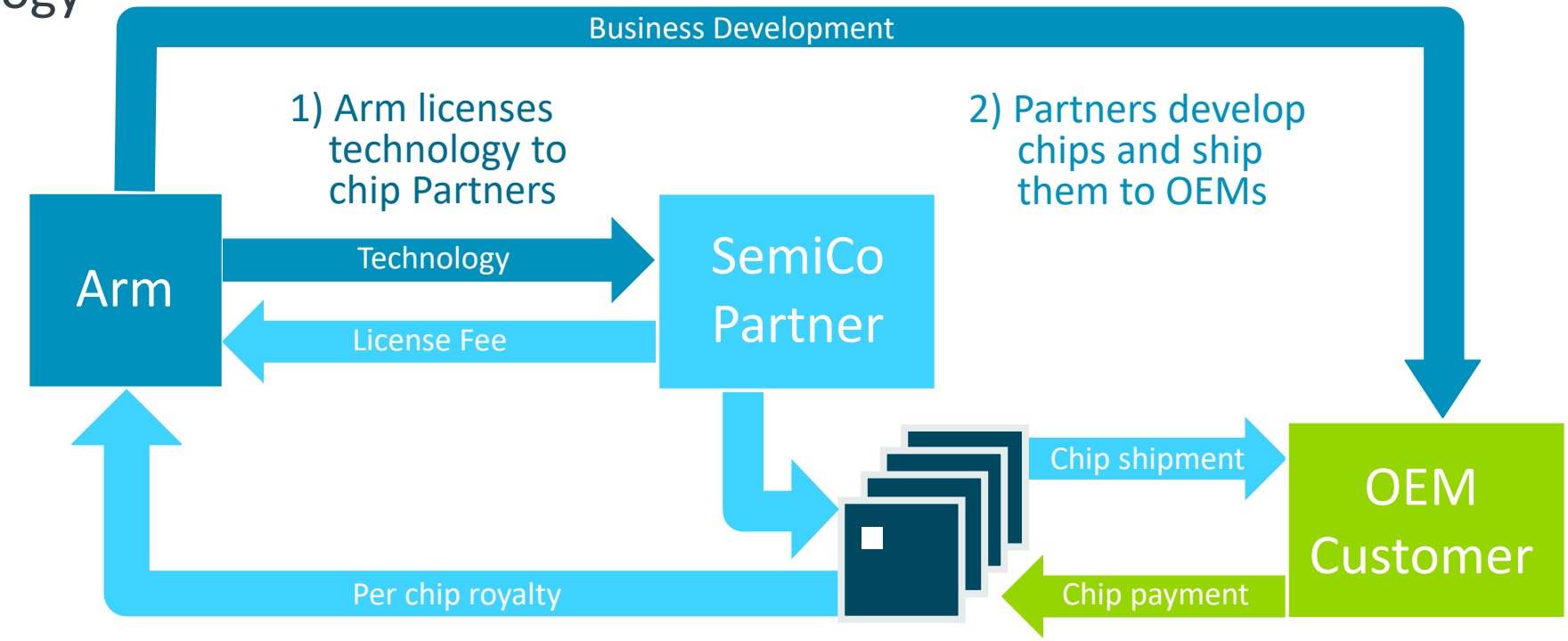
Arm's business model

Arm develops technology that is licensed to semiconductor companies

Arm receives an upfront license fee and a royalty on every chip that contains its technology



Licensing

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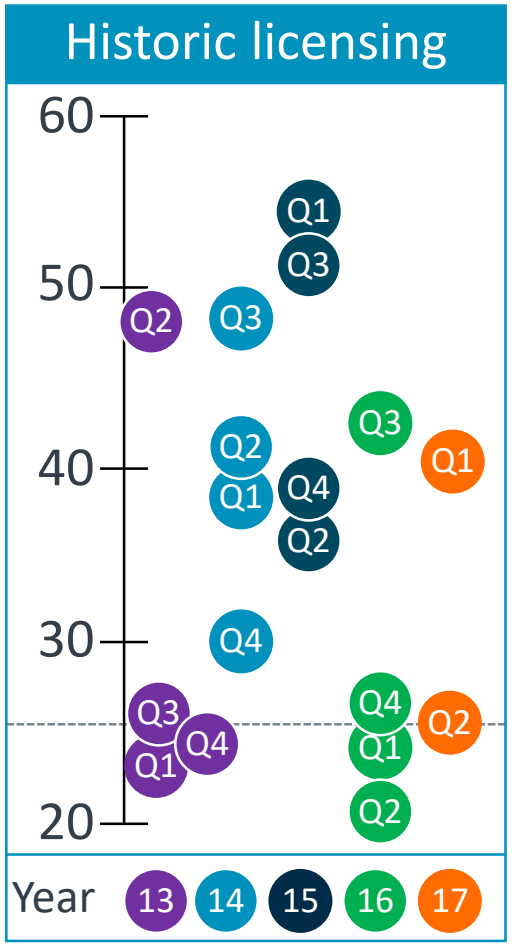
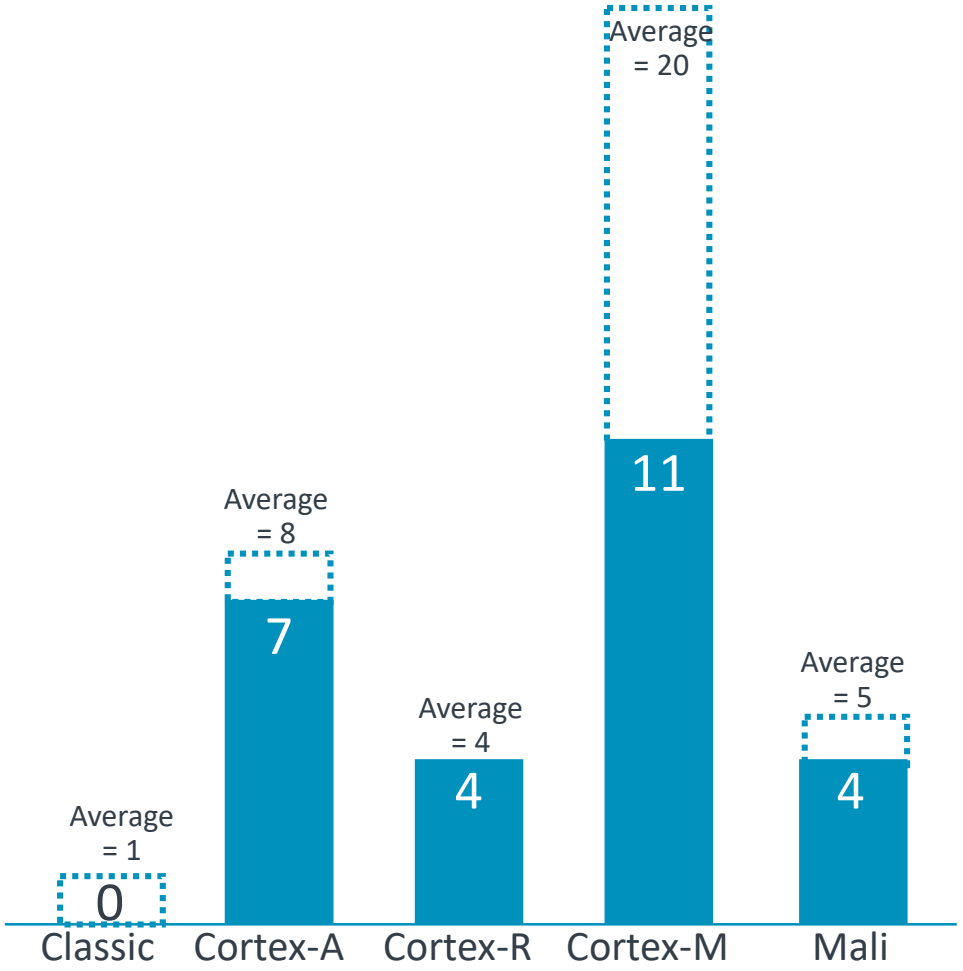
Q2 Licensing: 26 is the low-end of the normal range





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DesignStart for Cortex-M0 and Cortex-M3

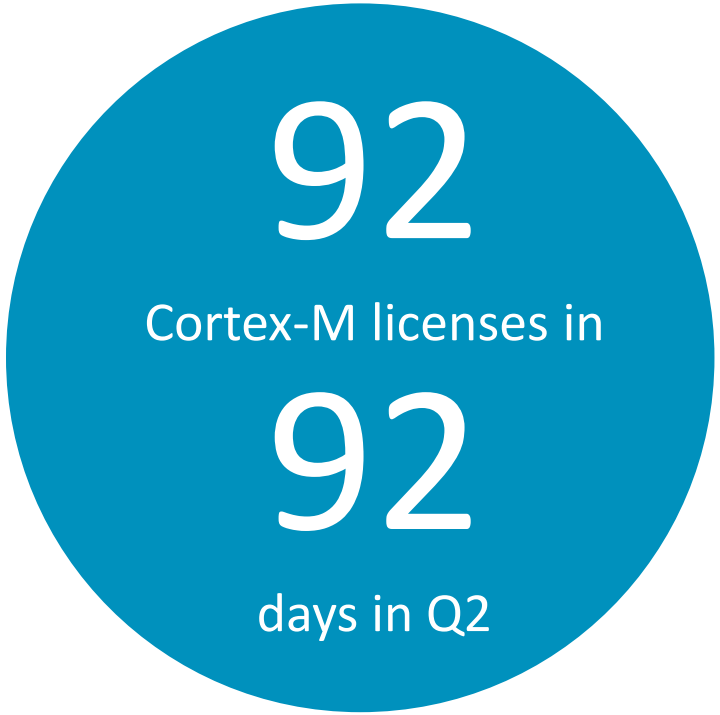
Faster access to IoT processors

No upfront fee

Accelerating the next trillion IoT devices

*DesignStart gives companies easy access to Arm IP. There is no upfront license fee, the partner pays royalties once chips enter production.

DesignStart – Enabling the entire industry to build chips



DesignStart Pro
Launched end June 2017
License-fee free; royalty bearing

DesignStart Eval
Launched end June 2017
No fees. Evaluation only.
Optimised for FPGA

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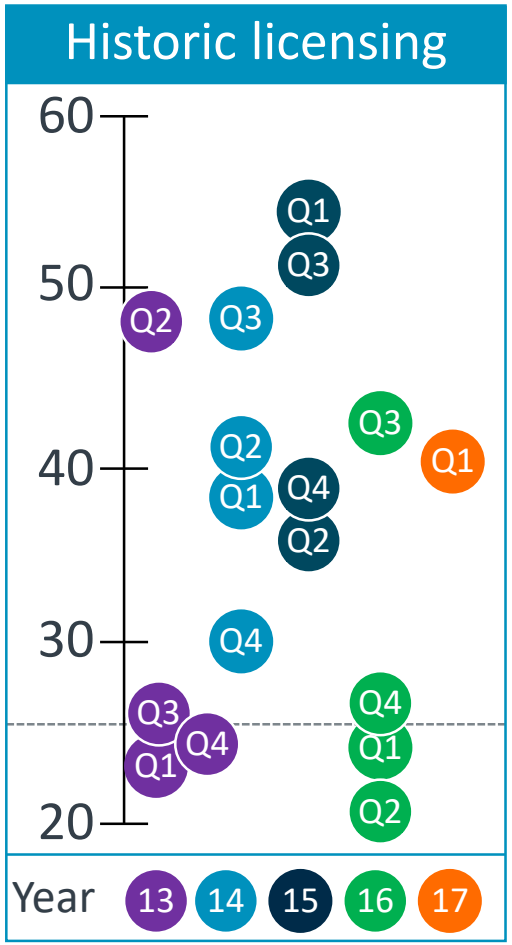
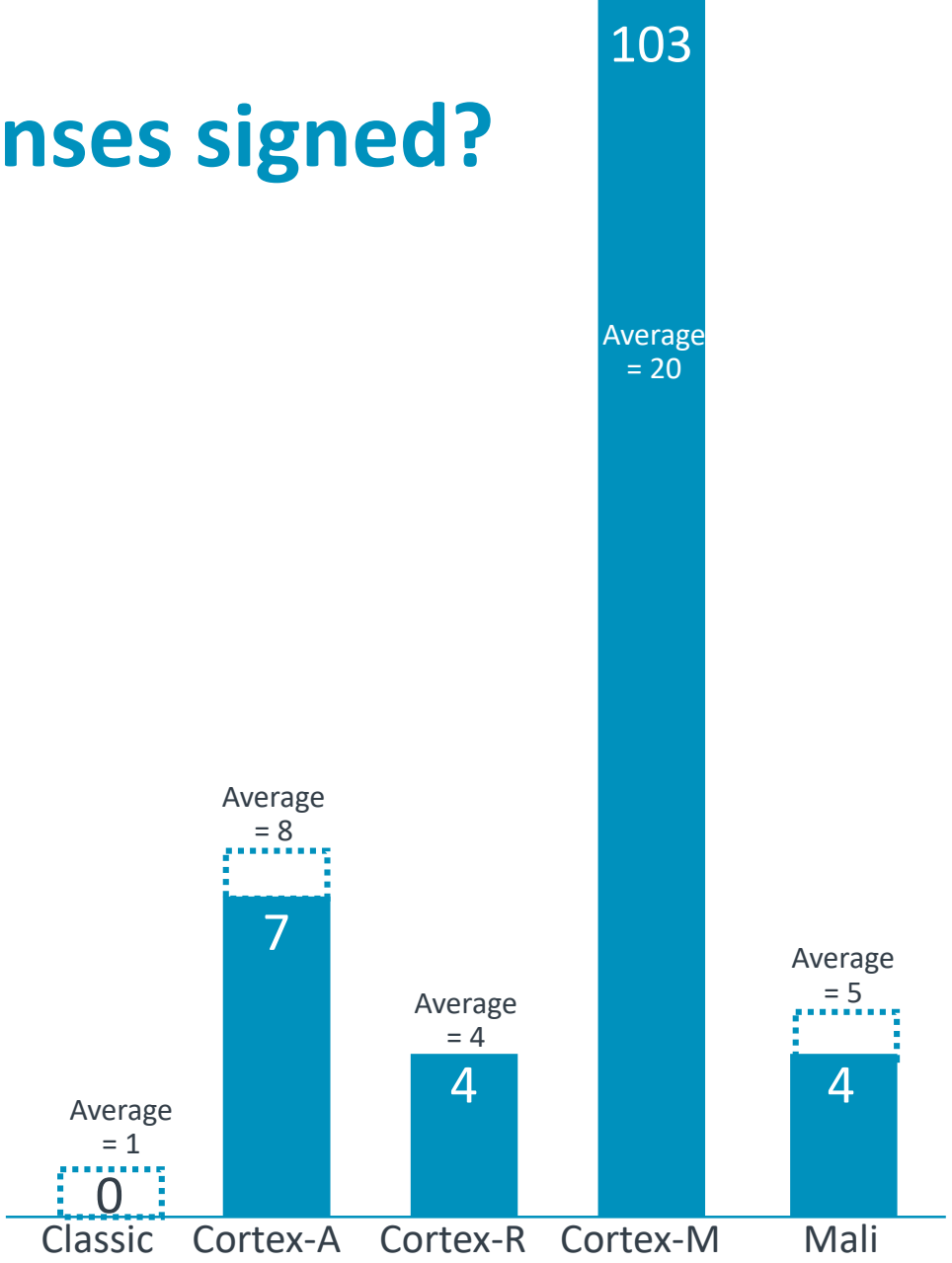
Q2 Licensing: 118 licenses signed?





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Royalties

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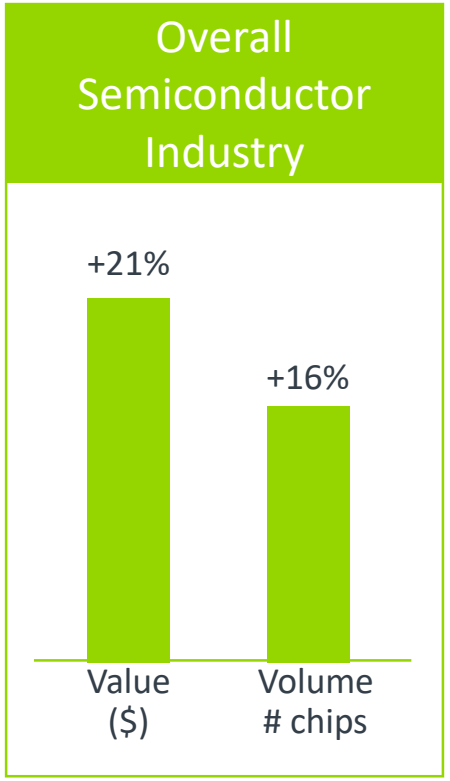
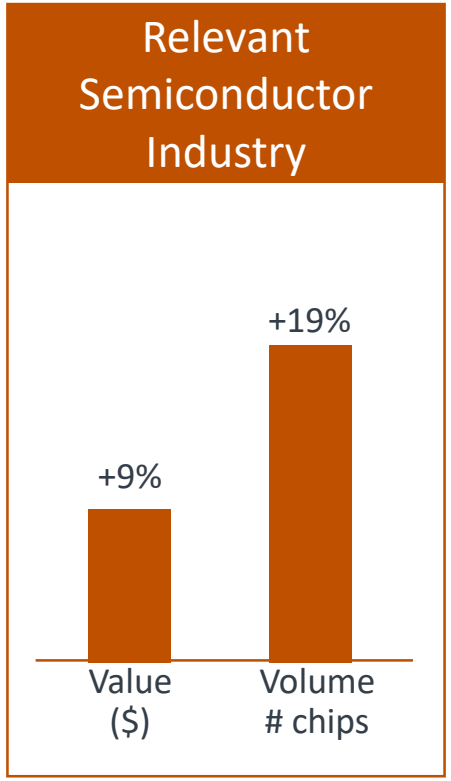
Industry growth vs Arm growth (for Q2 2017)

$190bn



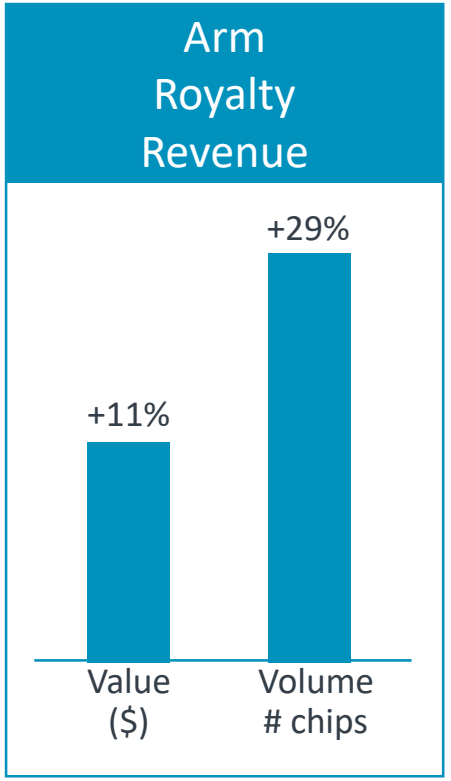
Strong growth in memory and graphics for data centre

$80bn



Strong growth in MCUs; slower growth in apps for mobile

$0.5bn



Arm gaining share in embedded Royalty rate increasing

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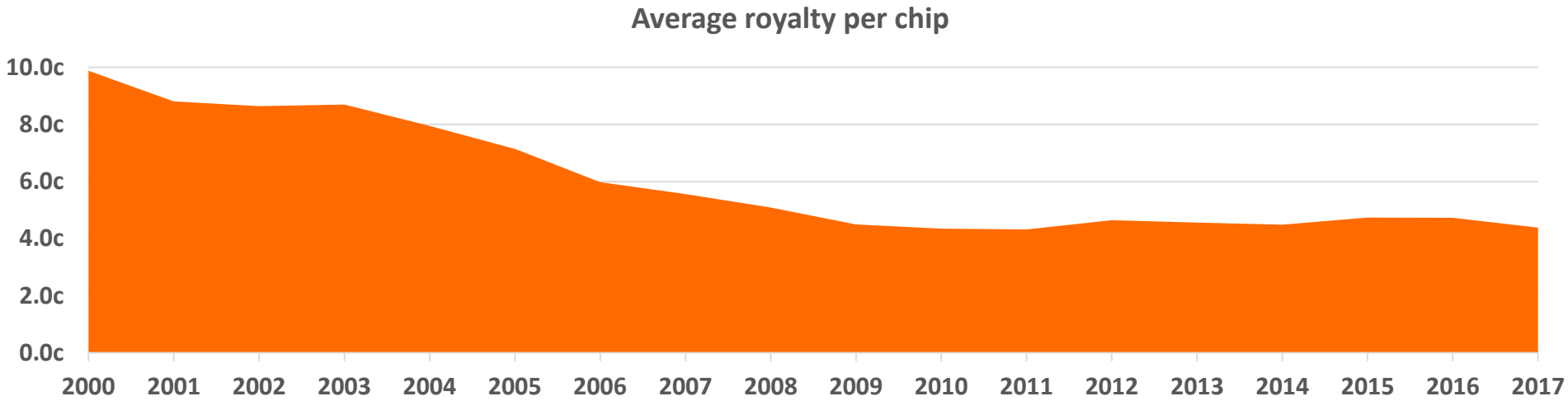
Is declining average royalty revenue per chip a concern?



Drivers of average

- Chip related: Average sales price of the chip; Arm content per chip
- Arm related: Average royalty rate per processor; increased content multipliers — Second
- Customer mix related: Which customers are winning share
- Market mix related: Which markets are growing fastest — Biggest impact on average over the long term

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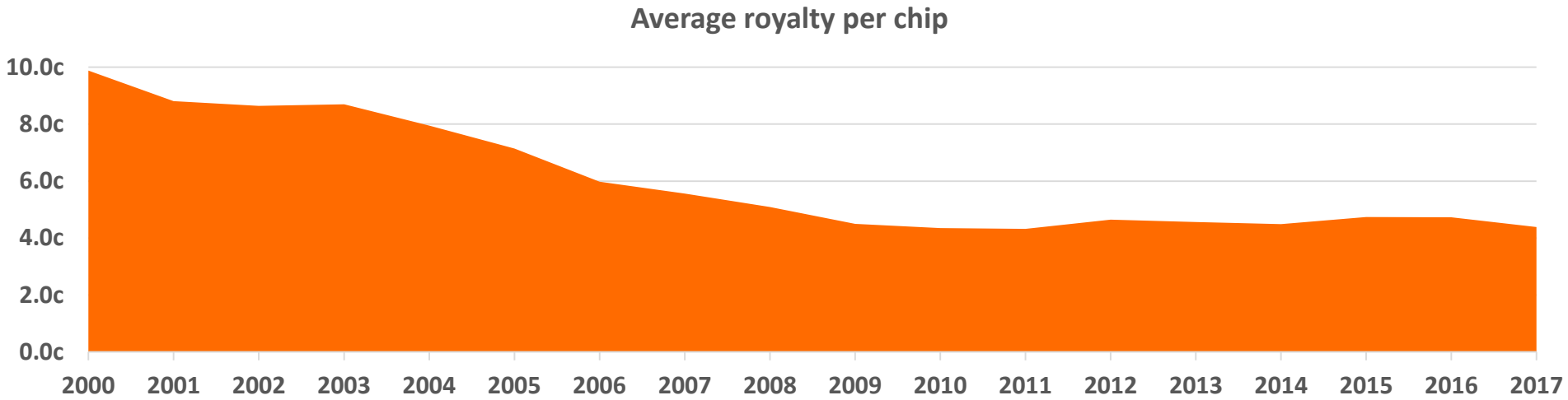
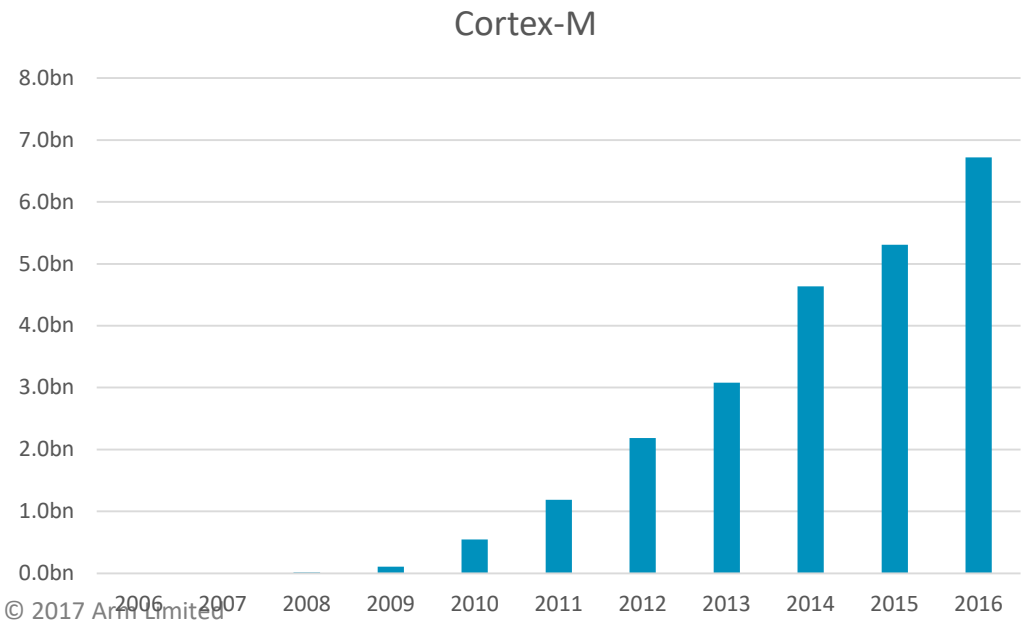
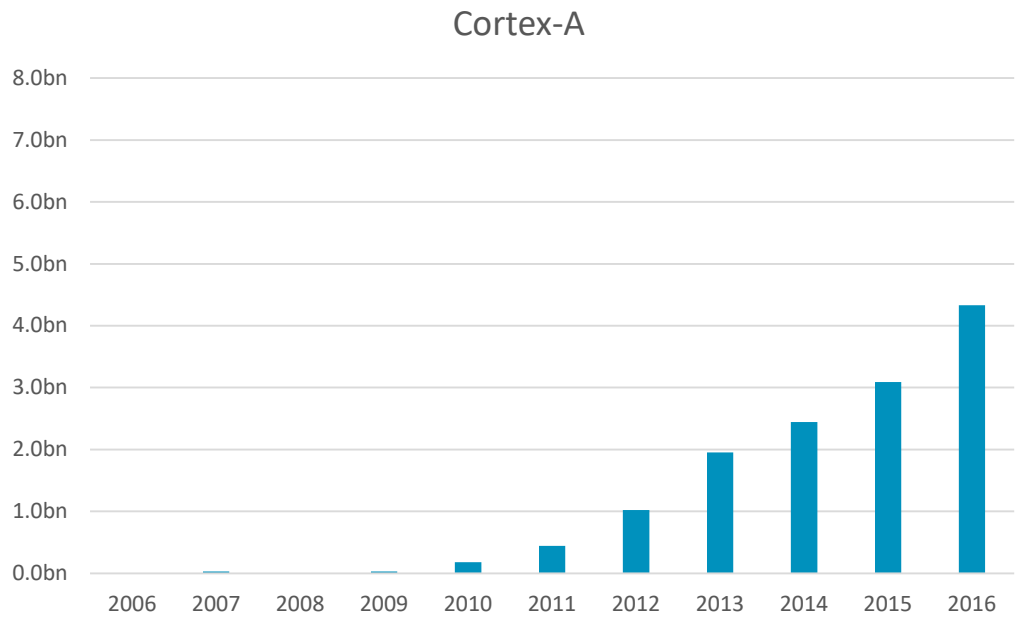
Is declining average royalty revenue per chip a concern?







Investments
Profitability

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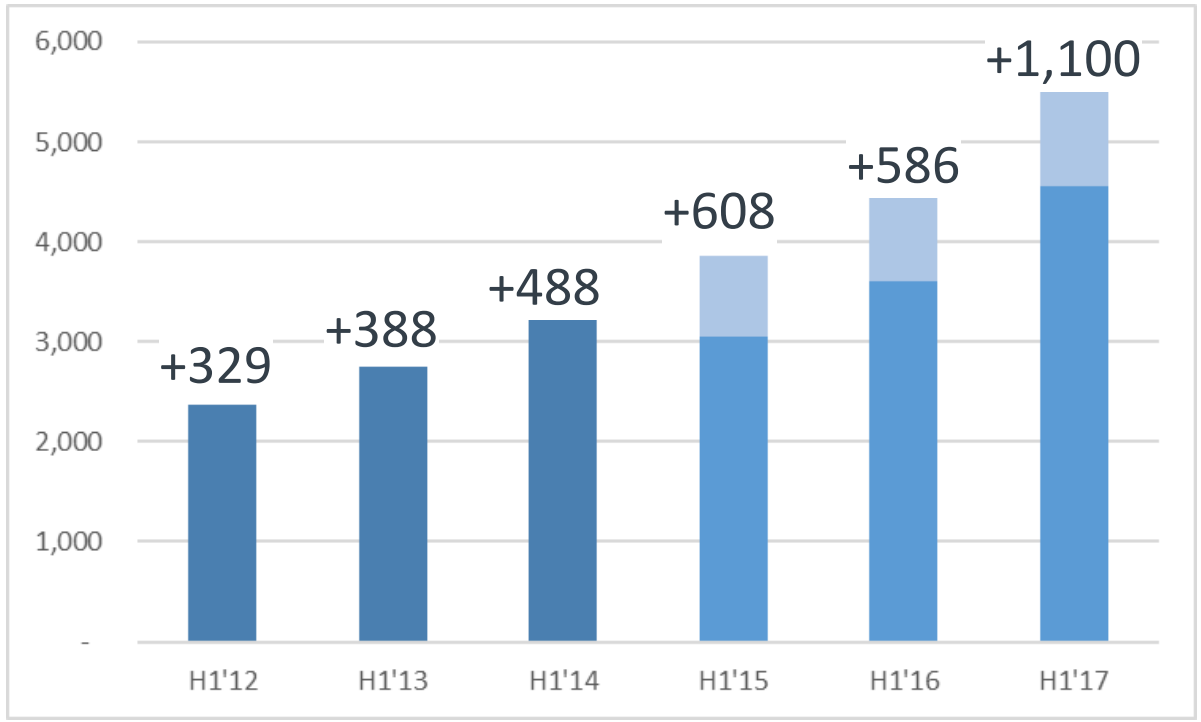
Investing in engineering to increase productive output



Arm recruitment is running at around 2x previous run rate

Focus on retaining quality as well as quantity; and on cultural and organisational integration

Will need to sustain this run rate for next 2-3 years

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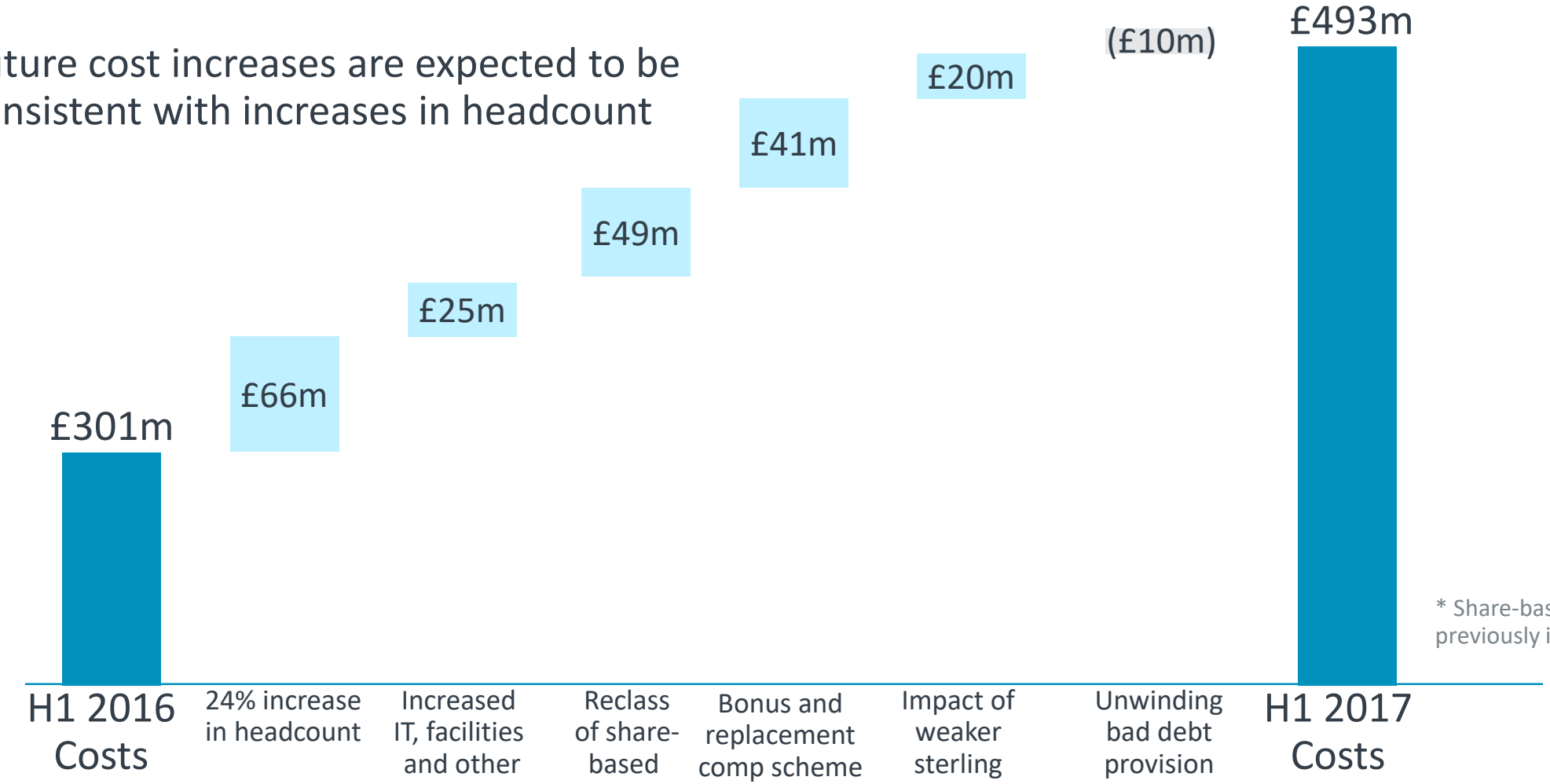
Investing in people, infrastructure to create new products

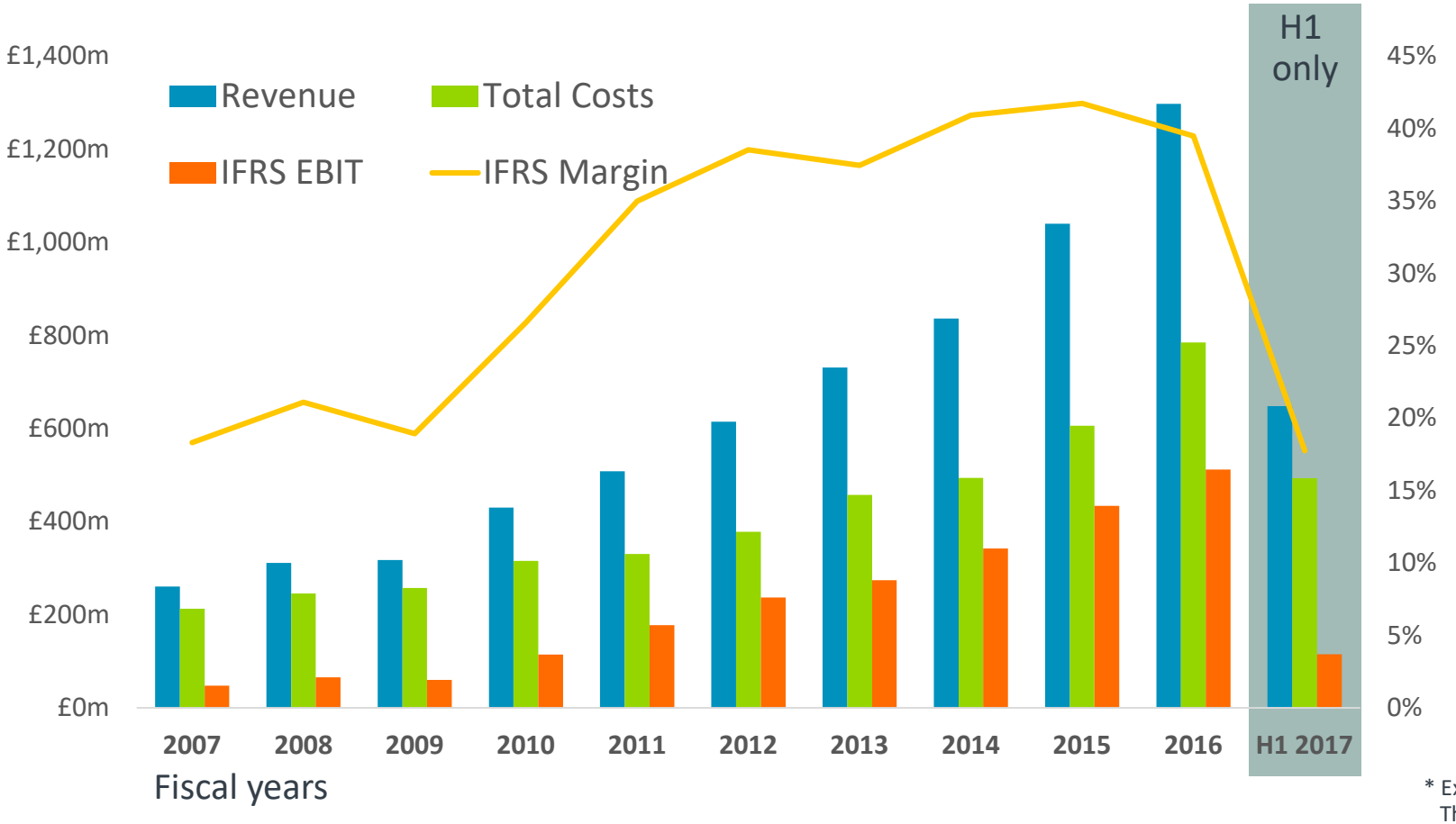
Costs were higher in H1 2017 as Arm expands R&D capability

Future cost increases are expected to be consistent with increases in headcount



* Share-based compensation was previously included in IFRS "other costs"

Revenues, profits and profitability



Over the past 10 years Arm's revenues grew faster than costs

H1 2017 vs H1 2016

• Revenues	+17%
• Headcount	+24%
• Costs	+64%
• Profits	-39%
• IFRS Margin *	18% vs 35%

* Excluding impact of currency fluctuations as USD/GBP went from 1.27 to 1.32 This contributed to £37m of non-cash costs due to revaluation of long-term contracts. Including these IFRS Margin would be 12%.

Note: Excludes certain one-offs
- 2013: Write down of MIPS patents (£100m)
- 2016: Execution costs associated with SoftBank acquisition

Progress vs strategy

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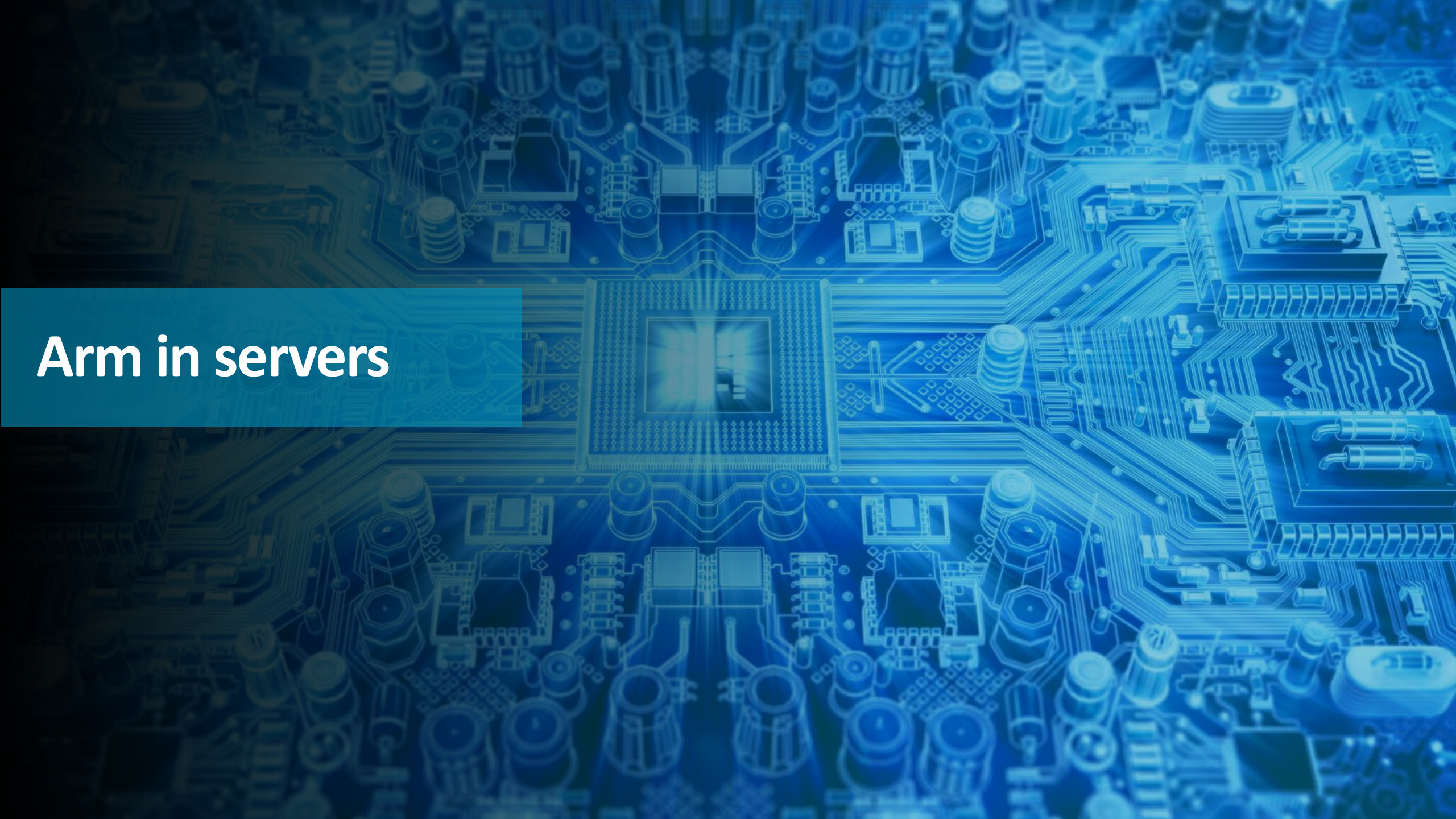
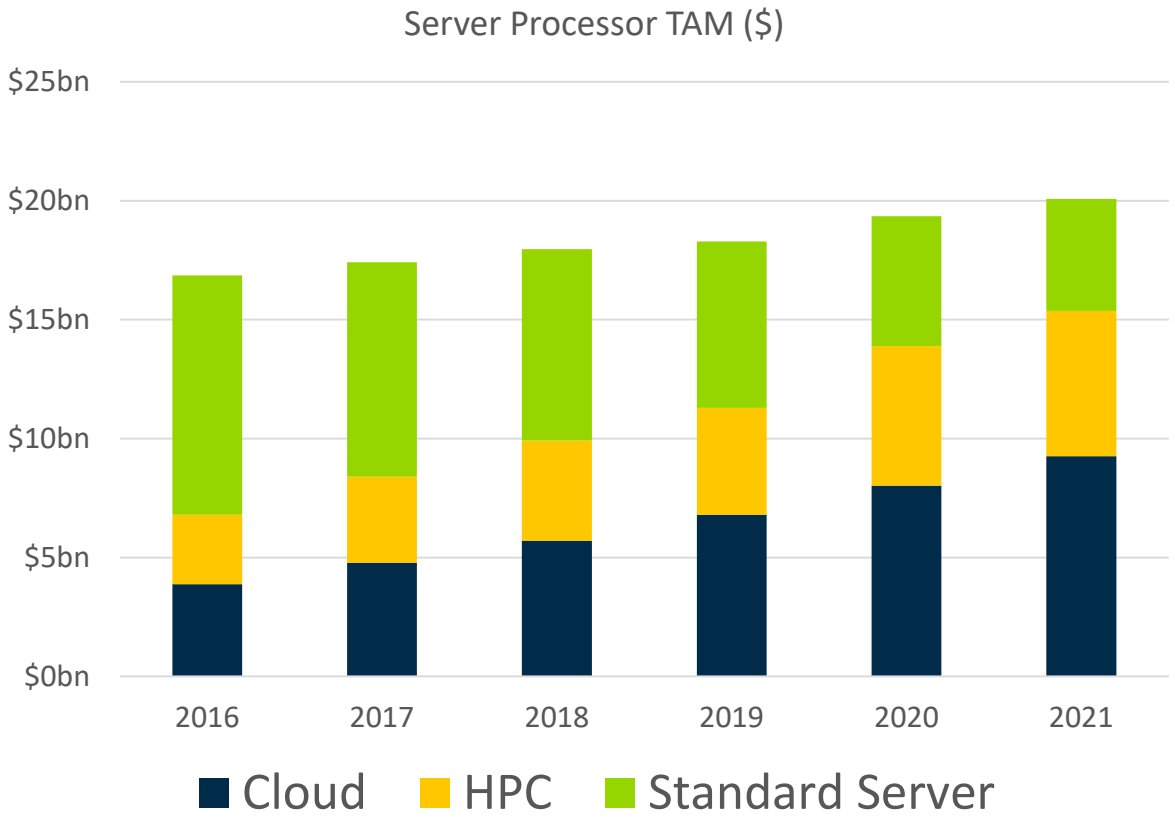


Arm in servers

Server market is changing



Standard enterprise

High-performance computing

Cloud

ARM focused on Cloud/HPC

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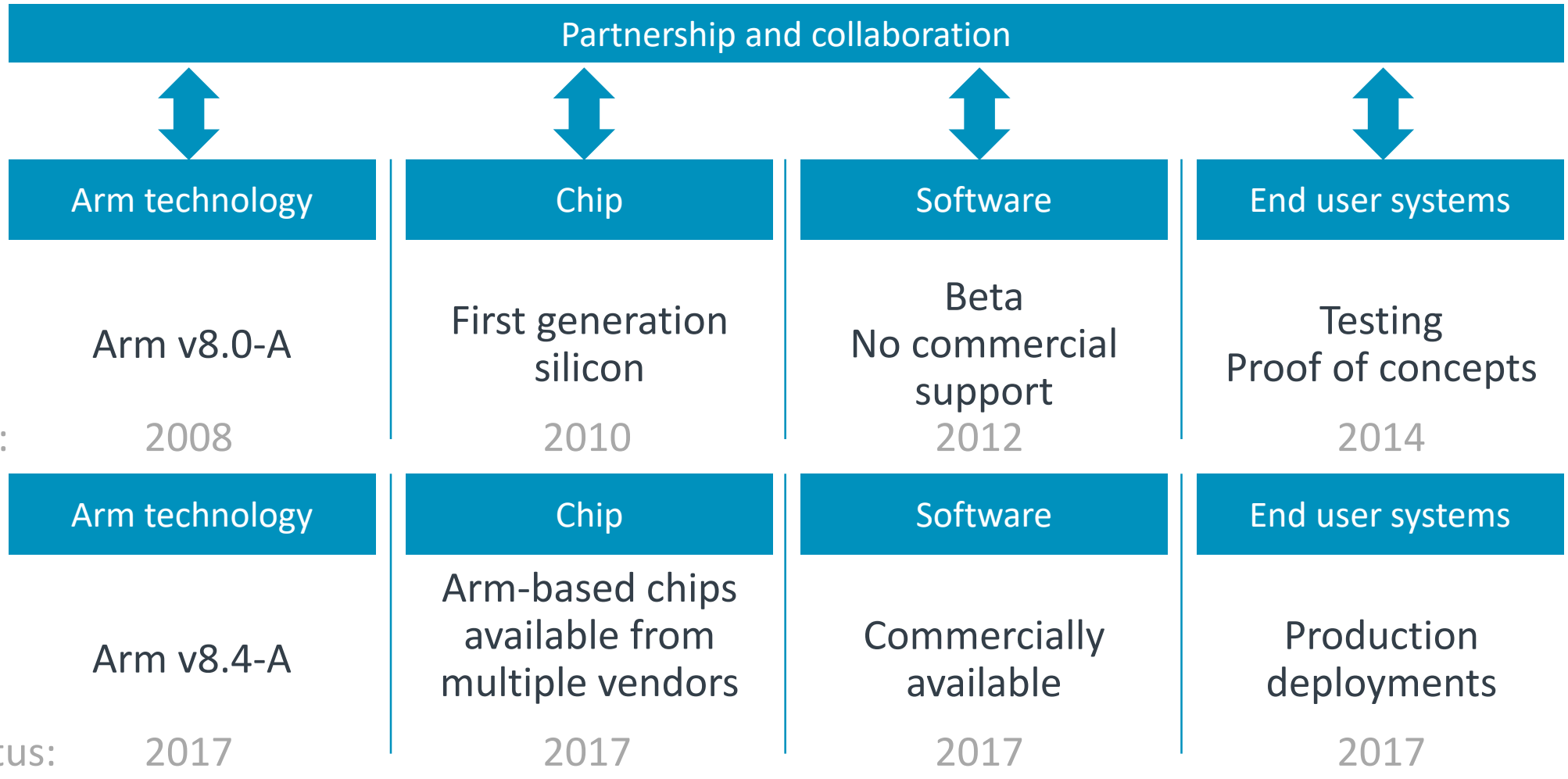
Arm's strategy to win share in servers



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Arm technology

	Arm v7-A	Arm v8.0-A	Arm v8.2-A	Arm v8.4-A
	Cortex-A15 Cortex-A9 Cortex-A7 Cortex-A5	Cortex-A72 Cortex-A57 Cortex-A53 Cortex-A35	Future Cortex-A75 Cortex-A55 Future	Future Future Future Future
Architecture released	2004	2011	2015	2017
New Capability	Multi-core processing Multimedia acceleration	64-bit computing Improved multi-core Improved multimedia	Improved multimedia Improved multi-core Improved error management Acceleration for AI/ML Acceleration for virtualisation	To be announced

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Arm-based chips available from multiple vendors

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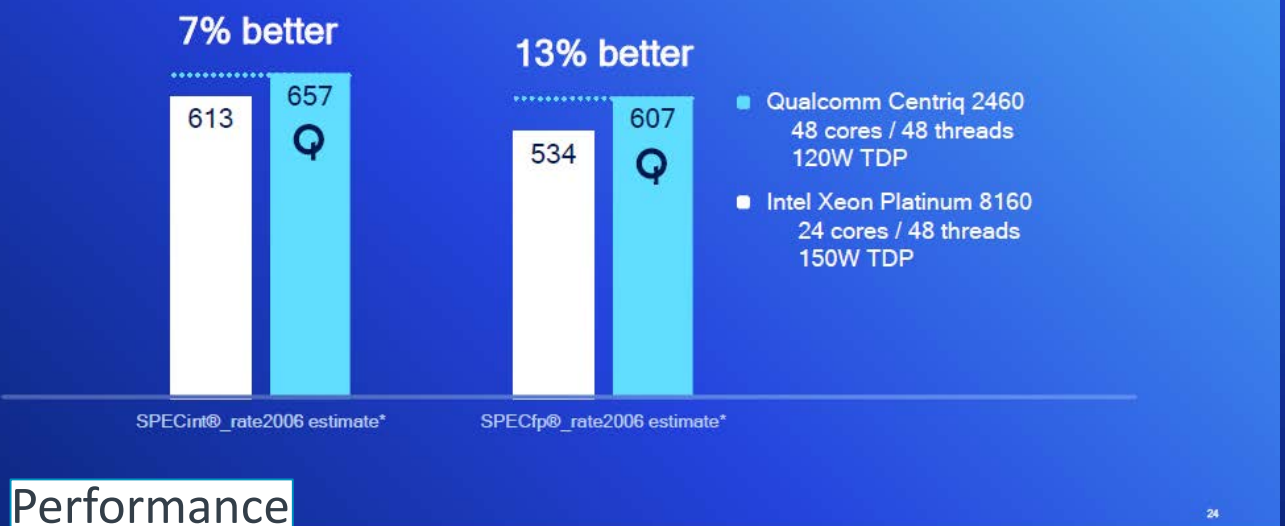
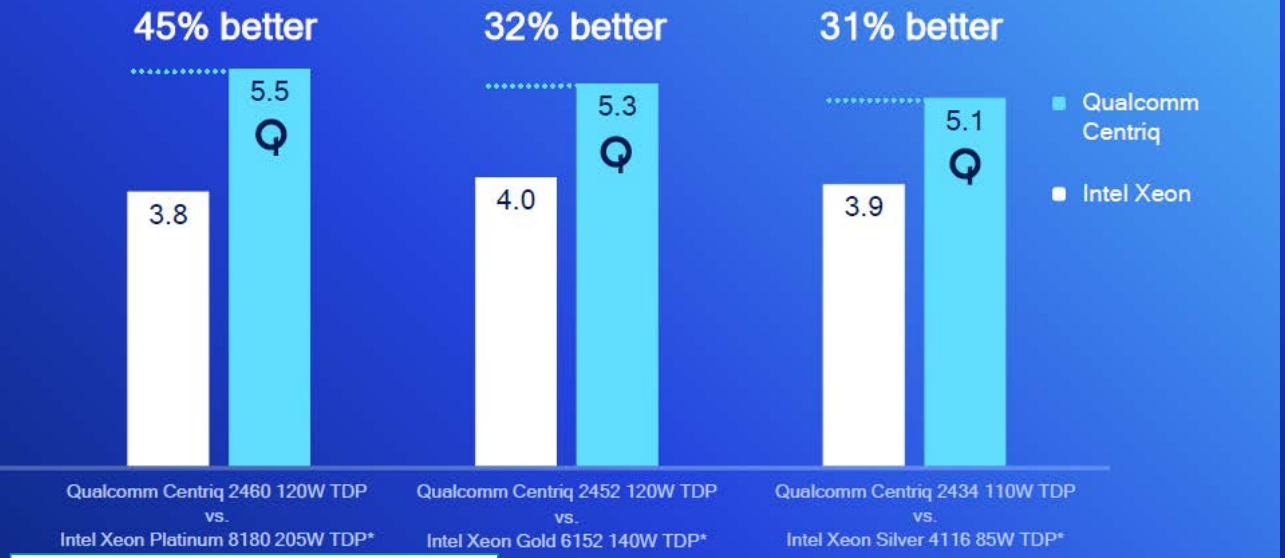
Arm silicon is competitive with current technology

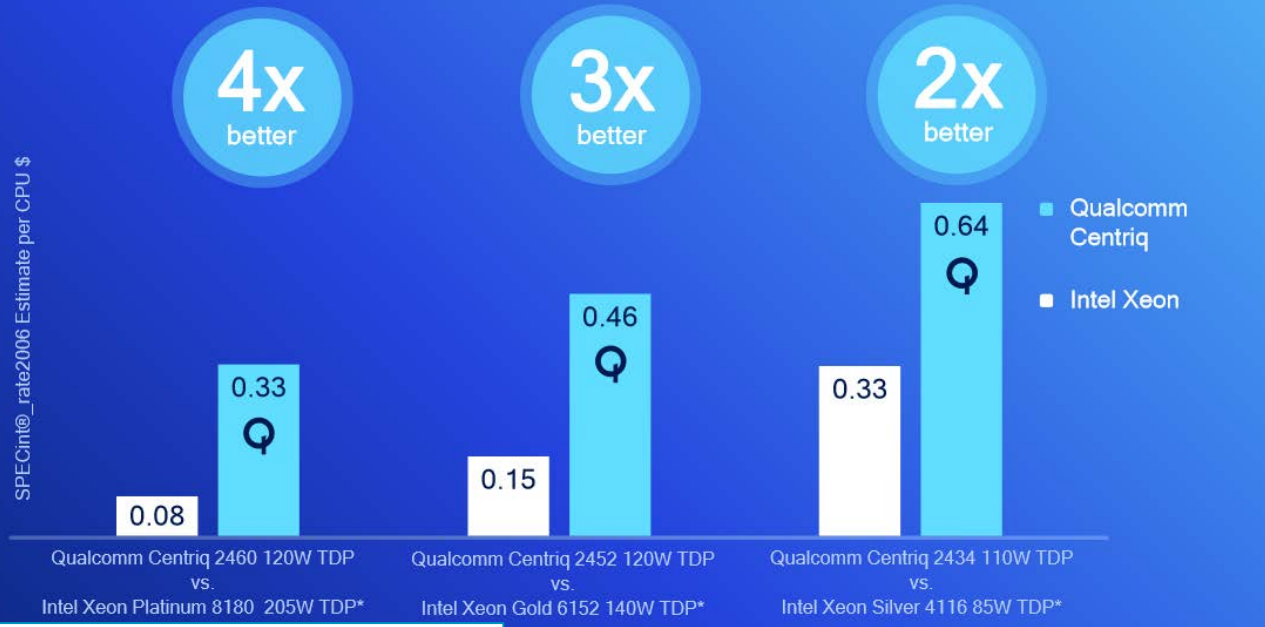


Performance

Performance per thread



Performance per Watt



Performance per dollar

Qualcomm Centriq 2400 processors

Arm server software is commercially available

All the major open source operating systems are now commercially available for Arm-based servers

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Arm servers are being deployed by cloud companies

amazon web services

Alibaba Cloud
aliyun.com

Tencent Cloud

Microsoft Azure

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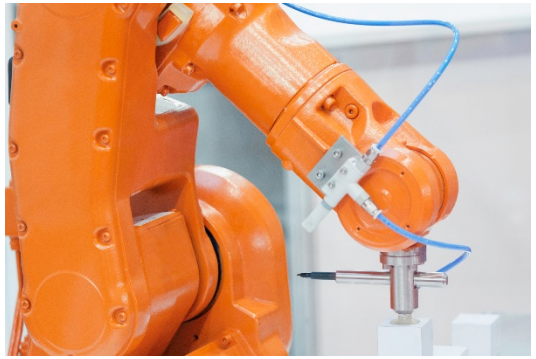
Distributing intelligence everywhere

Mobile

Automotive

Robotics



Drones

IoT

Home, surveillance & analytics

VR/MR

Shipping & logistics

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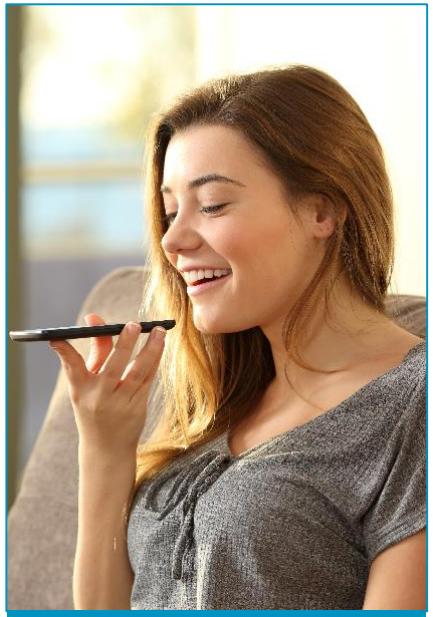
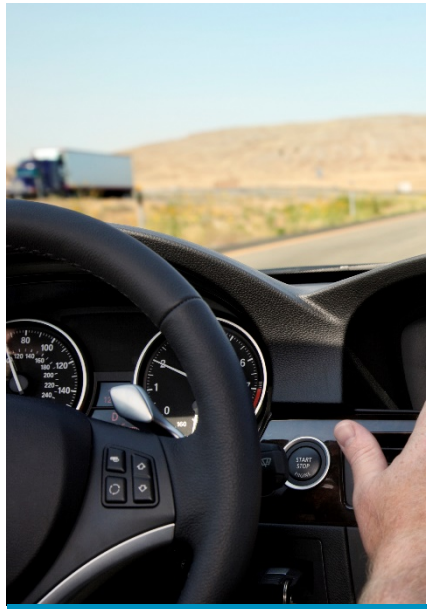
Complete
Touch ID is ready. Your print can be used for unlocking your iPhone.
Continue

From the cloud to the edge

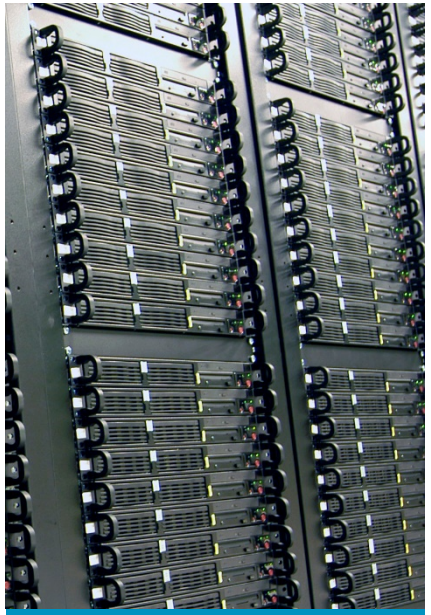
Security



Privacy



Latency



Bandwidth

Power and Cost

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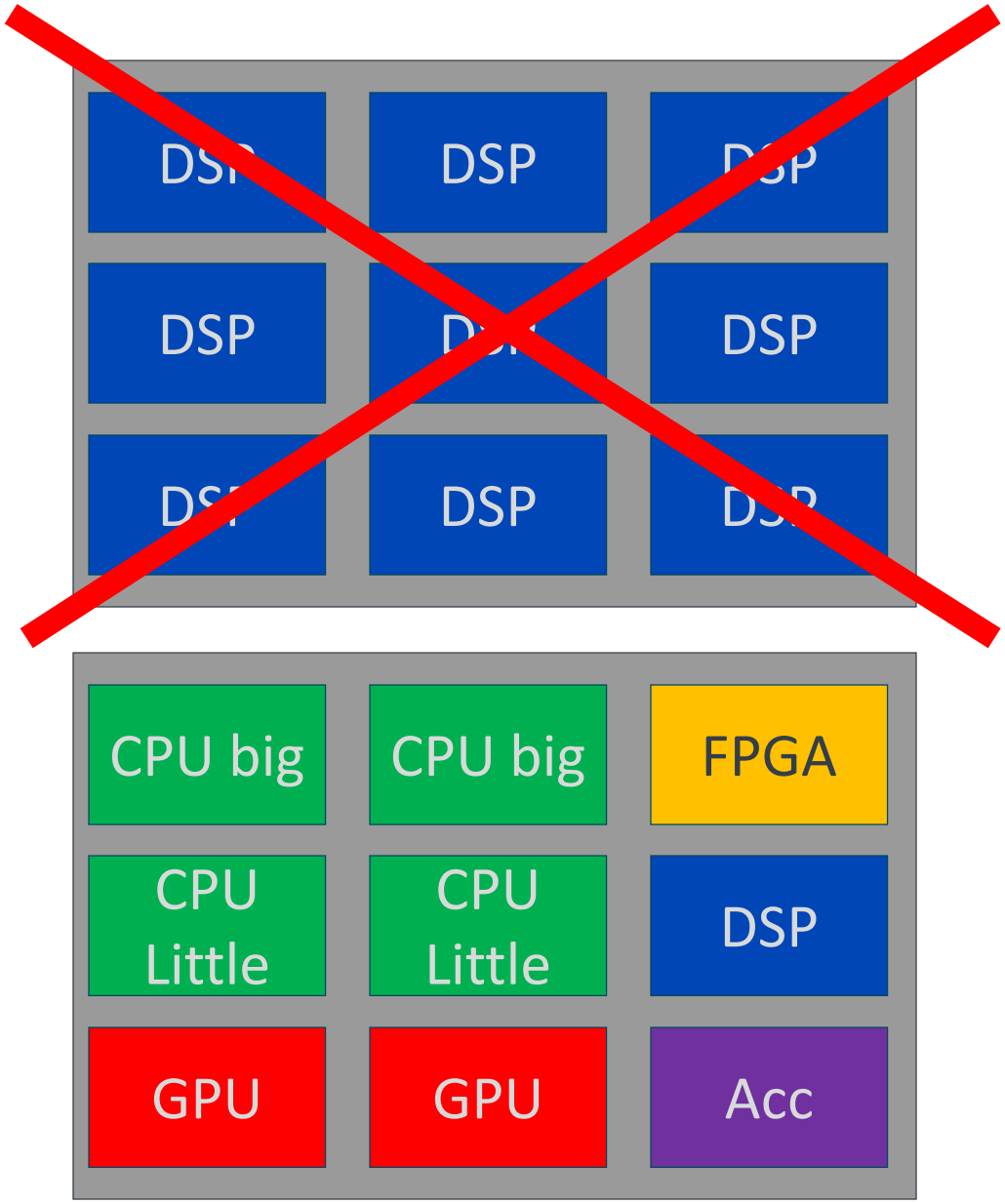
Heterogeneity is necessary

There is no one size fits all solution

Need multiple types of processors to handle this

Fixed function works when requirements known in advance, algorithm is well understood, and high performance needed

Programmable cores are essential



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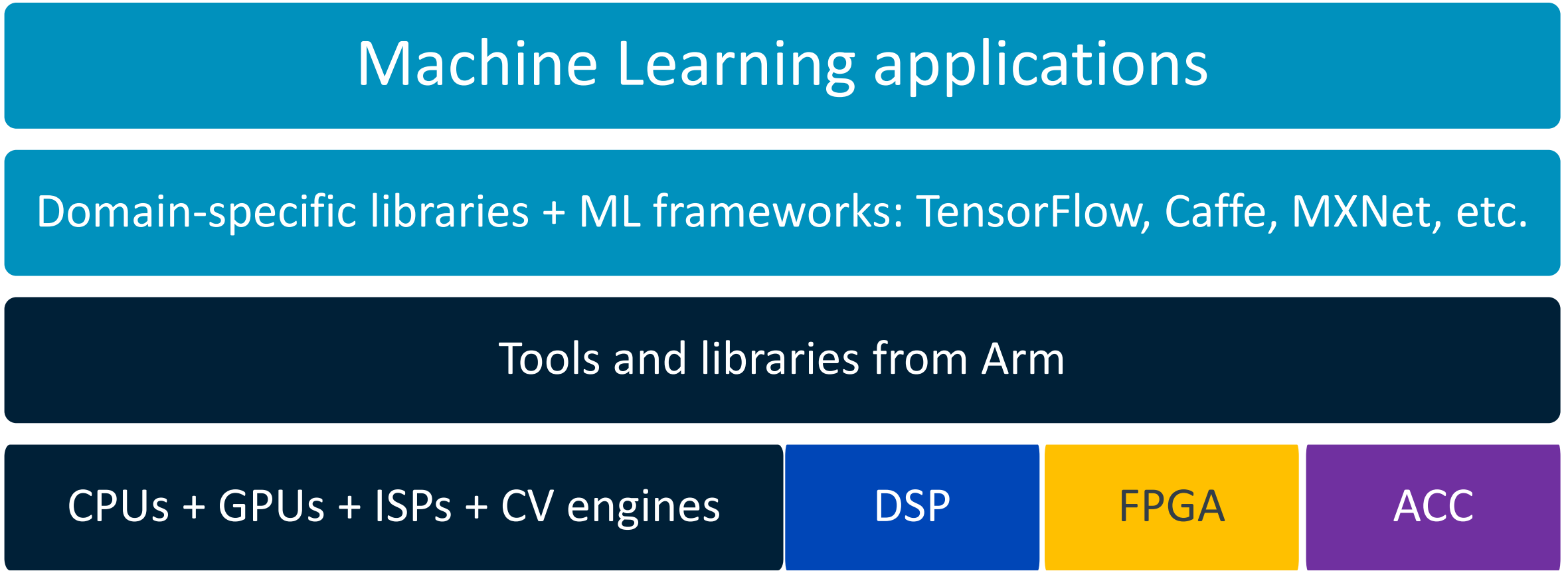
Arm's approach to AI



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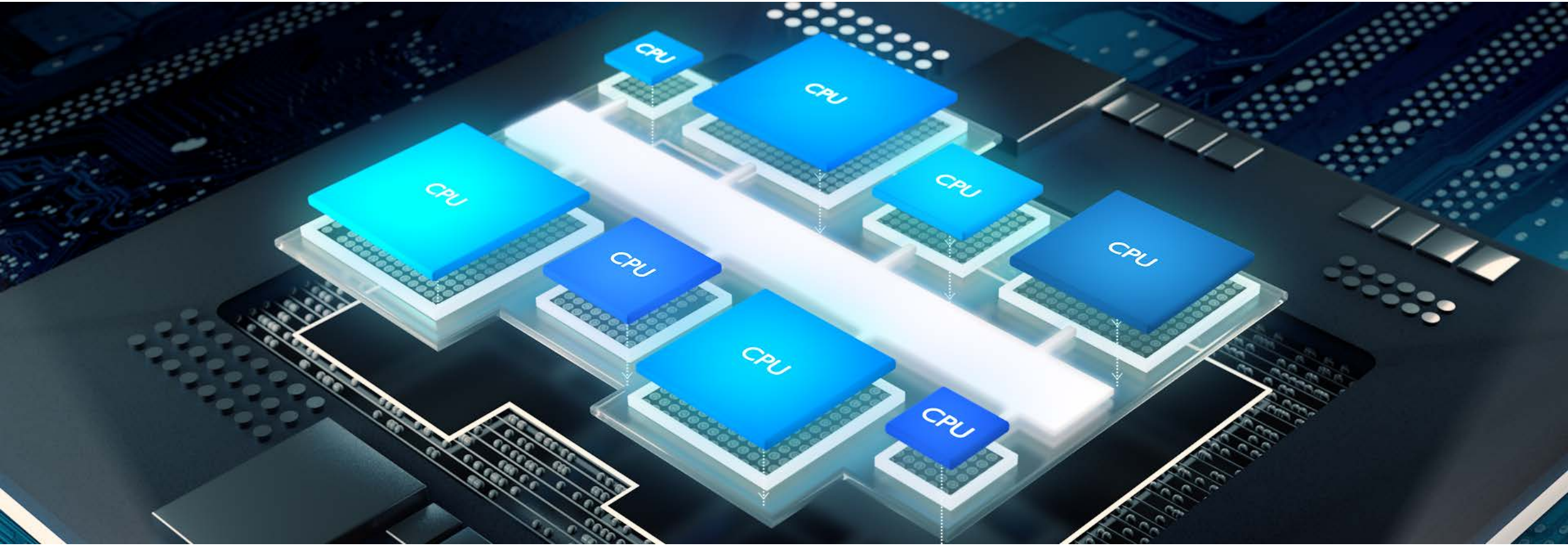
ARM DynamIQ – Multicore redefined

ARMDYNAMIQ



New single cluster design

Greater flexibility

Redesigned memory sub-system

Advanced compute capabilities

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Journey of the autonomous automotive

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“90% of automotive innovation comes from electronics (semiconductors) and software.”

– Audi at CES Asia

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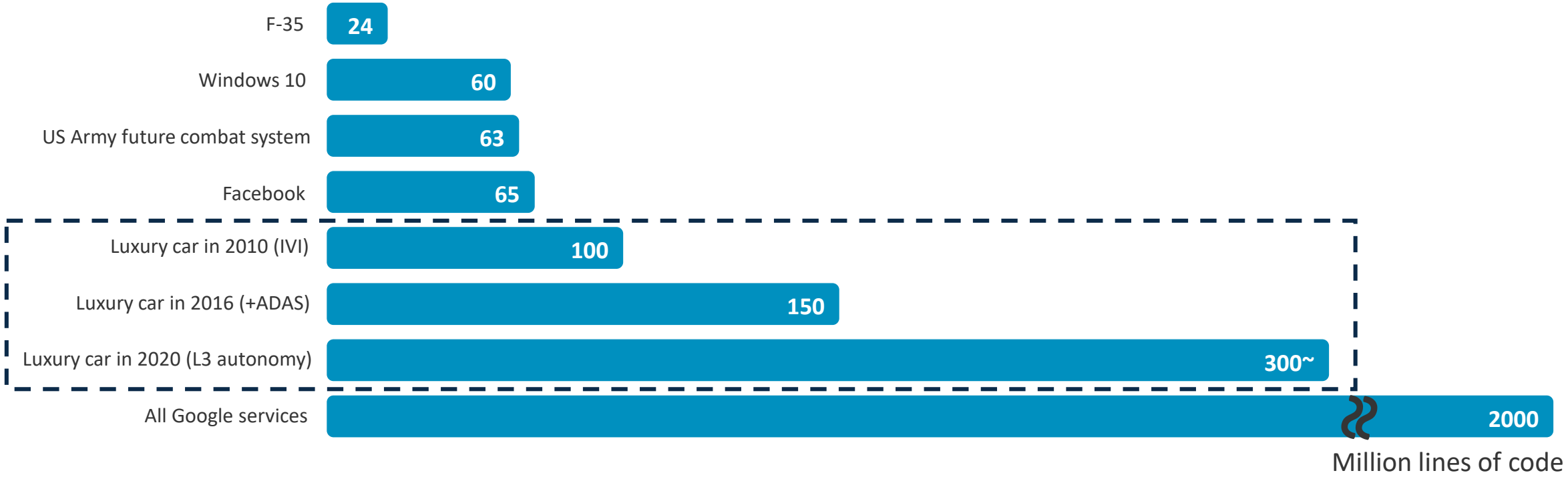
Cars run on code



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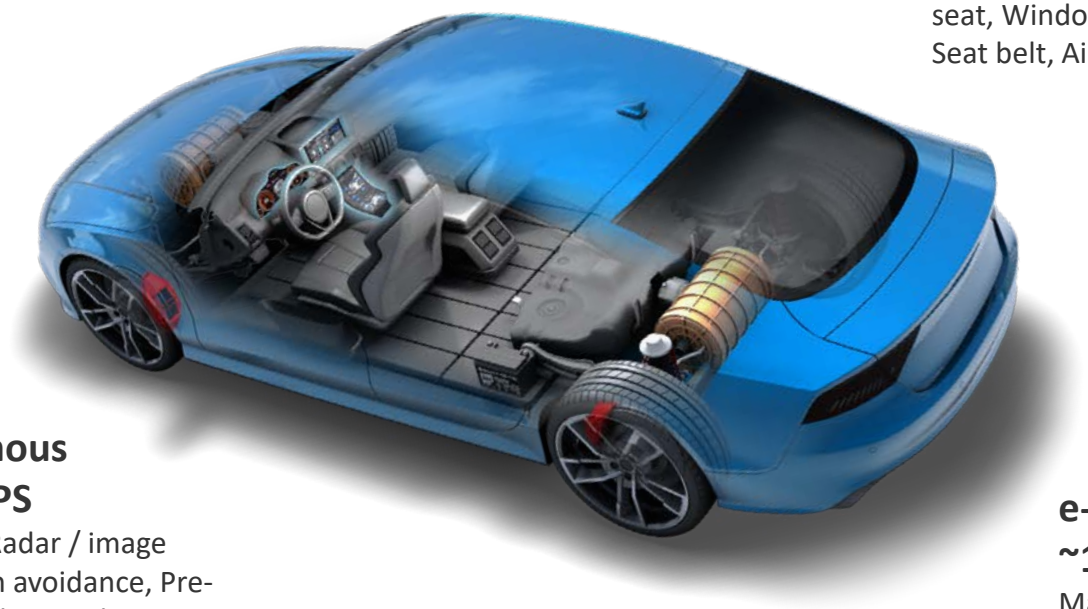
Automotive compute in 2020

Cockpit
~50,000 DMIPS
Audio Visual, Maps, Traffic, Toll payment, Google services
Rear entertainment, Voice recognition, Gesture control, Cluster and HUD

Connected Gateways
~20,000 DMIPS
LTE 5G, WiFi, Bluetooth connecting to CAN FD, LIN, Flexray, Ethernet

Body Electronics
<10,000 DMIPS
HVAC, Lighting, Doors, Electric seat, Windows, Mirrors, Cameras, Seat belt, Air bag, BCM



Semi Autonomous
~350,000 DMIPS
Level 3 autonomy, Radar / image processing, Collision avoidance, Pre-crash, Cruise control, Lane departure, Parking

Chassis
~15,000 DMIPS
EPS, ABS/EBS, Active VDC, EPB

e-Powertrain
~15,000 DMIPS
Main Motor control, Transmission, Engine control, Generator/E-water pump
Battery management

High-end smartphone
30,000-50,000 DMIPS
Main applications processor, WiFi, modem, sensors, etc.

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Timeline for autonomous driving

2016	2018	2020	2025
	Advanced • Several control functions • Collision Avoidance Steering (Low speed) • Advanced camera systems • CAN FD (10Mbps) • Sensor fusion	**HIGHLY AUTOMATED** • All-round collision avoidance • Limited automated driving • Ride sharing • Camera systems with 4k • Ethernet bus (1Gbps)	**AUTONOMOUS** • Start of fully automated driving • High speed all-round collision avoidance • Car sharing • Connected vehicle to vehicle • Interactive
Relative to 2016 Vehicles	20X performance 10X Data rate	40-50X performance 100X Data rate	100X performance 400x Data rate
Scalable processing solutions			

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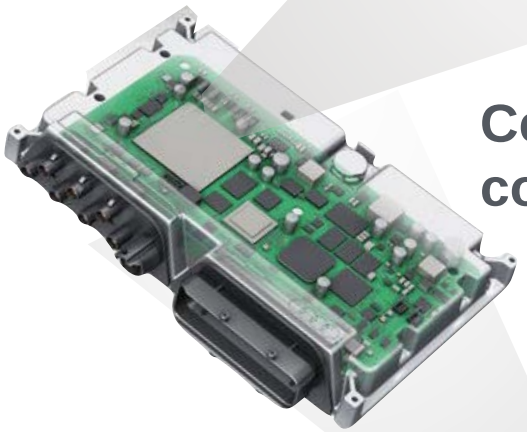


Central driver assistance controller “zFAS”

New Audi A8

Powering the world’s first self-driving car*

NVIDIA Tegra K1

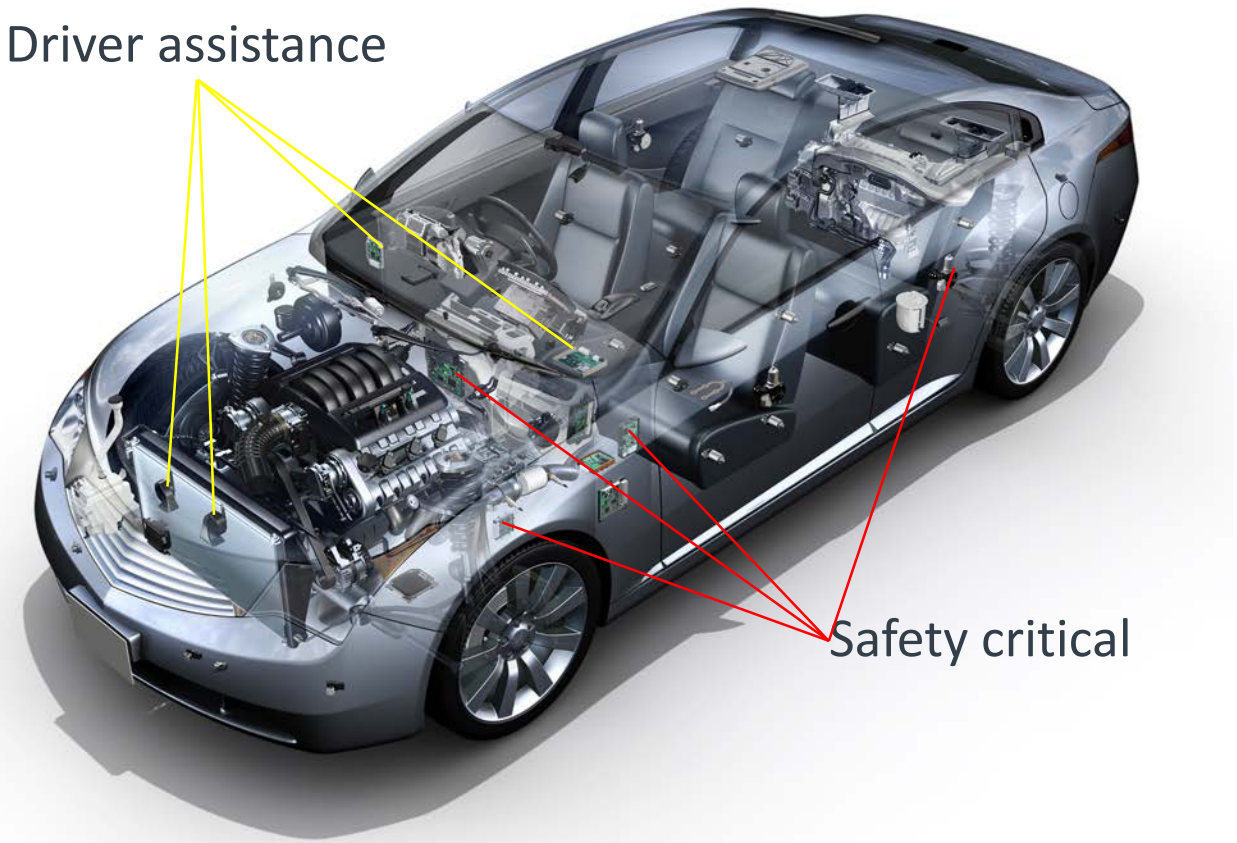
zFAS using NVIDIA Tegra K1 - based on Quad core Arm Cortex-A15

*As a production car (autonomy level 3)

Denso licenses first ever Arm processor (Cortex-R52)

Targeting advanced driver assistance and safety critical systems

DENSO



Cortex-R52: Highest performance real-time processor

First processor with embedded virtualisation to simplify software consolidation

Designed for functional safety systems

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Thank You!
Danke!
Merci!
谢谢!
ありがとう!
Gracias!
Kiitos!
감사합니다
धन्यवाद