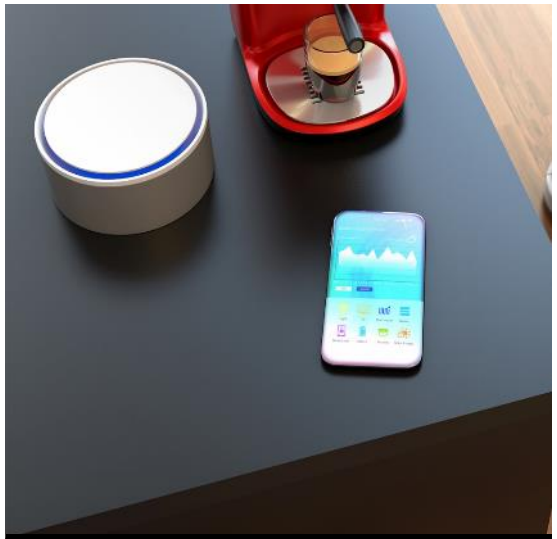
Arm Holdings

Q3 2017 Roadshow Slides

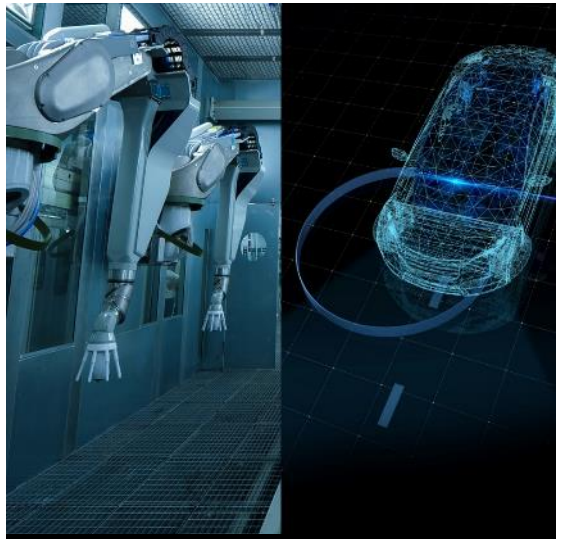
Arm Holdings is a subsidiary of SoftBank

arm

Technology trends that will redefine all industries



Artificial Intelligence in every device



Autonomous machines

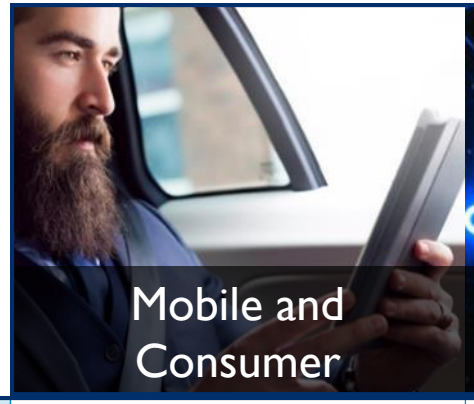
Augmented reality

Hyperscale cloud and connectivity

Security and Privacy

arm

Arm defines the technology that will redefine all industries

	 Mobile and Consumer	 Networking and Servers	 Automotive and Robotics	 Internet of Things
Artificial Intelligence in every device	✓	✓	✓	✓
Autonomous machines			✓	✓
Augmented reality	✓		✓	
Hyperscale cloud and connectivity		✓		✓
Security and Privacy	✓	✓	✓	✓

Arm introduction

Global leader in technology licensing

- R&D outsourcing for semiconductor companies

Innovative business model

- Upfront licence fee – flexible licensing models
- Ongoing royalties on partner sales
- Technology reused across multiple applications

Long-term, secular growth markets

>1,550 licences
Growing by >100 every year

>500 potential royalty payers

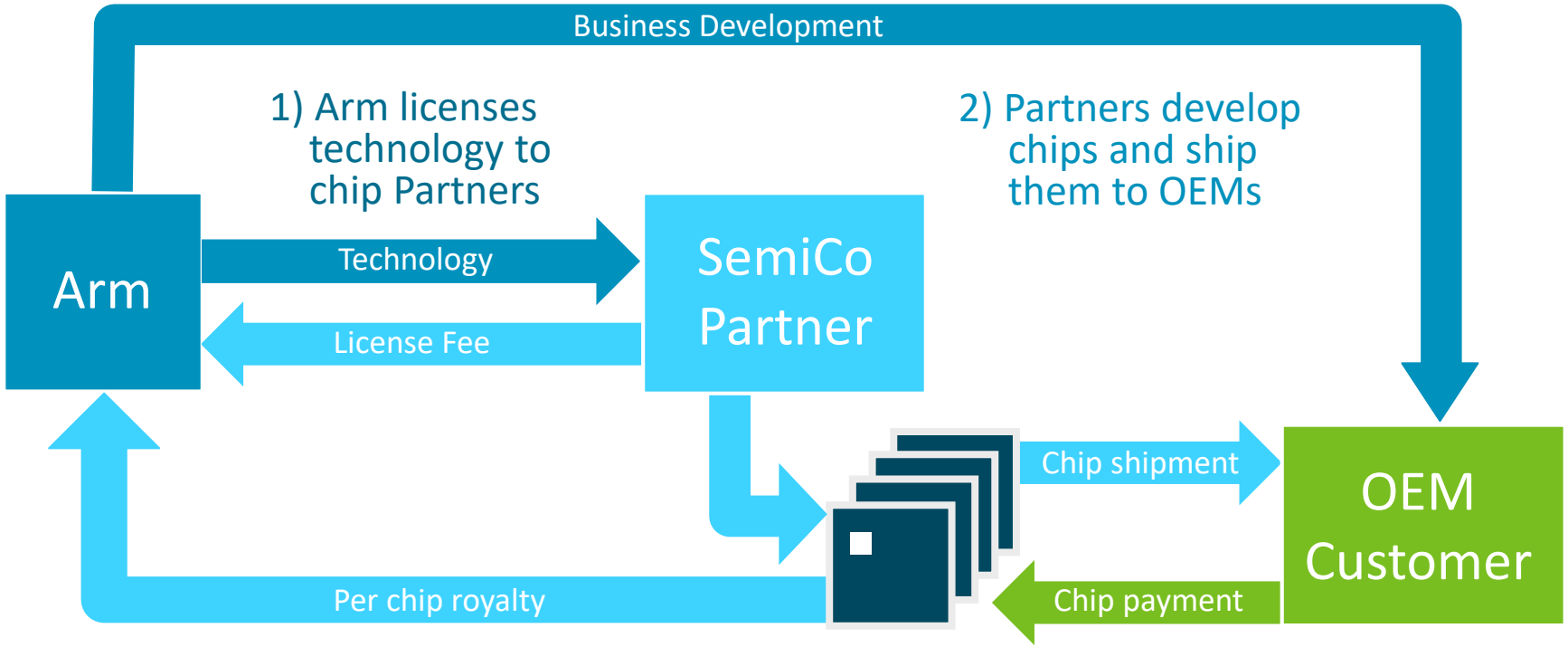
>20 bn Arm-based chips shipped in past year

~15% CAGR over previous 5 years

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



Arm’s strategy

Maintain or gain share in long-term growth markets

- From mobile phones to networking infrastructure and servers to embedded smart devices and automotive

Increase value of Arm technology per smart device

- Invest in developing more advanced processors with higher royalty rates
- Physical IP and multimedia IP further increase Arm's value per chip

Explore and exploit new opportunities in emerging applications created by the Internet of Things

Invest to create a sustainable business, fit for the long term

- Create superior returns by developing new technology that will deliver increased profits and cash generation in the future




Arm's main growth markets

Application Processors

- Smartphones, tablets and laptops
- Apps processor, modem, connectivity, touchscreen and image sensors
- Growth coming from higher-value Arm technology such as Arm v8-A, octa core, multimedia

Networking & Servers

- Base stations, routers, switches, and servers for cloud and data centres
- Networks evolve to cope with increased data at lower latency: virtualisation, integration and programmability
- Most major chip vendors have announced Arm-based products

Embedded Markets

- Automotive, white-goods, wearables, smart devices in industrial and utilities
- Microcontrollers, smartcards, embedded connectivity chips
- 200 companies have licenced Arm processors for use in embedded intelligent devices

arm

History of Arm

Joint venture between Acorn Computers and Apple

1990

Designed into first mobile phones and then smartphones

1993 onwards

Now all electronic devices can use smart Arm technology

Today

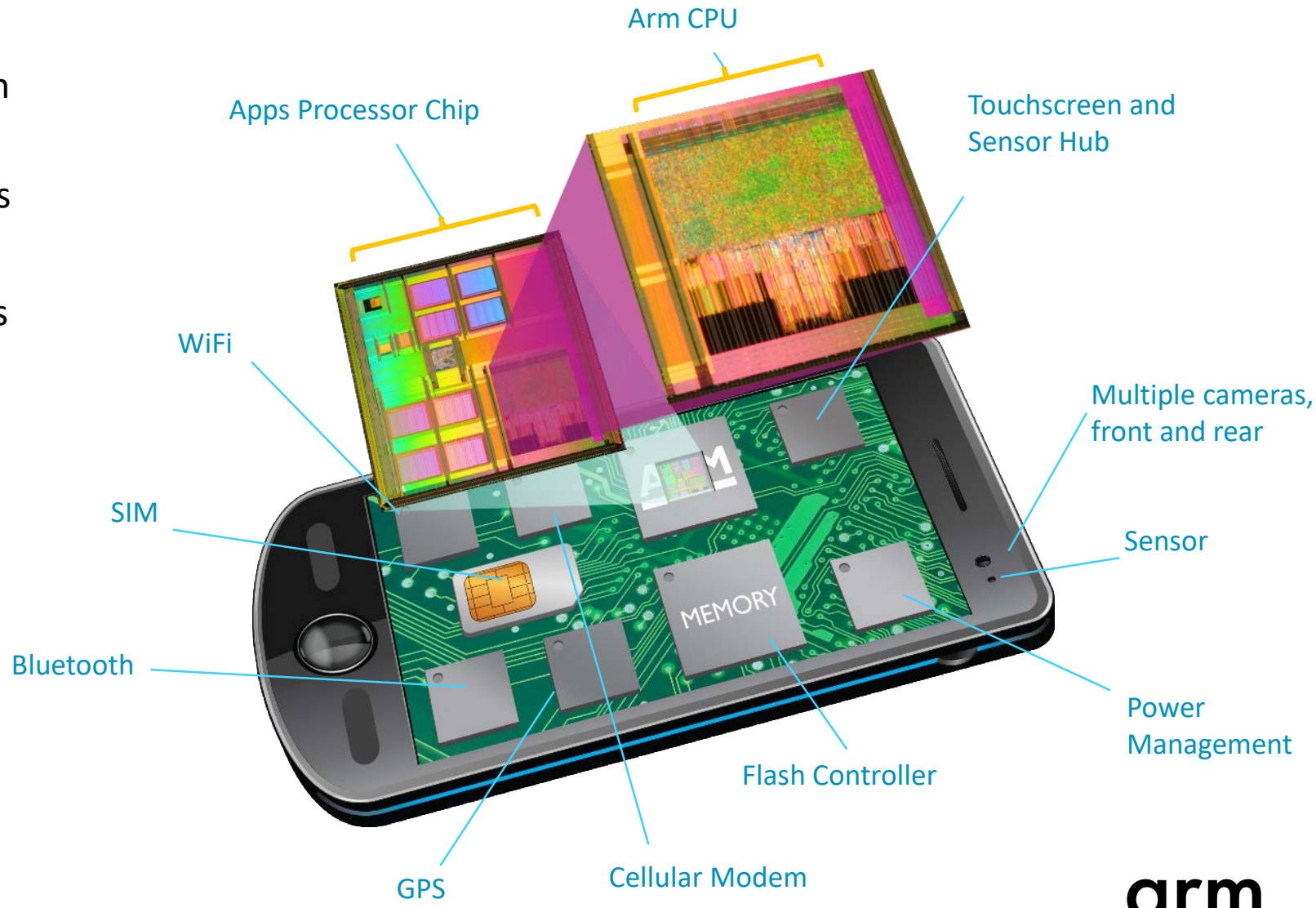
arm

Smart devices contain many Arm processors

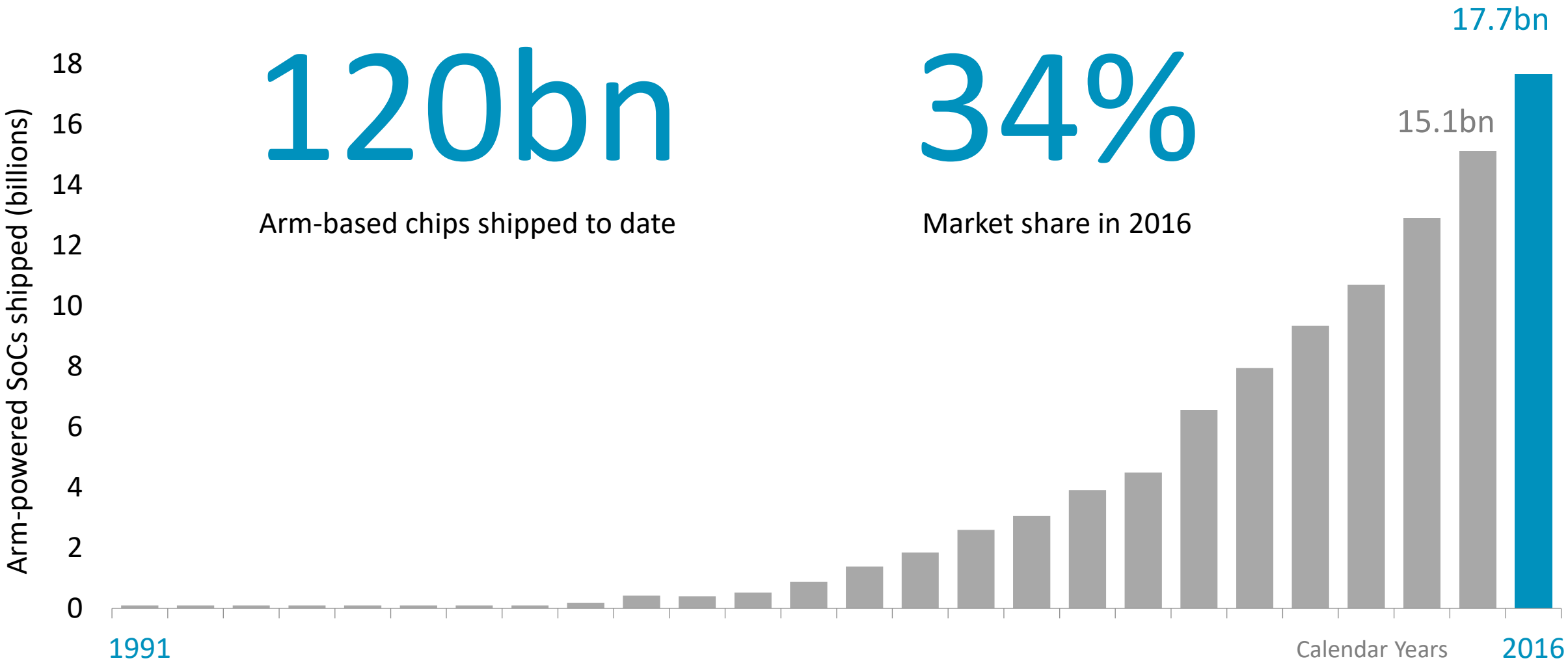
Applications Processor chips can contain multiple Arm technologies

- Arm v8-A processor for OS and apps
- Cortex-R controller for modem
- Cortex-M controllers for peripherals
- Arm Mali multimedia processors: GPU, video, display, camera, etc.
- Arm physical IP

When new functions are added to smartphones it creates opportunity for new Arm IP



Arm-based chip shipments

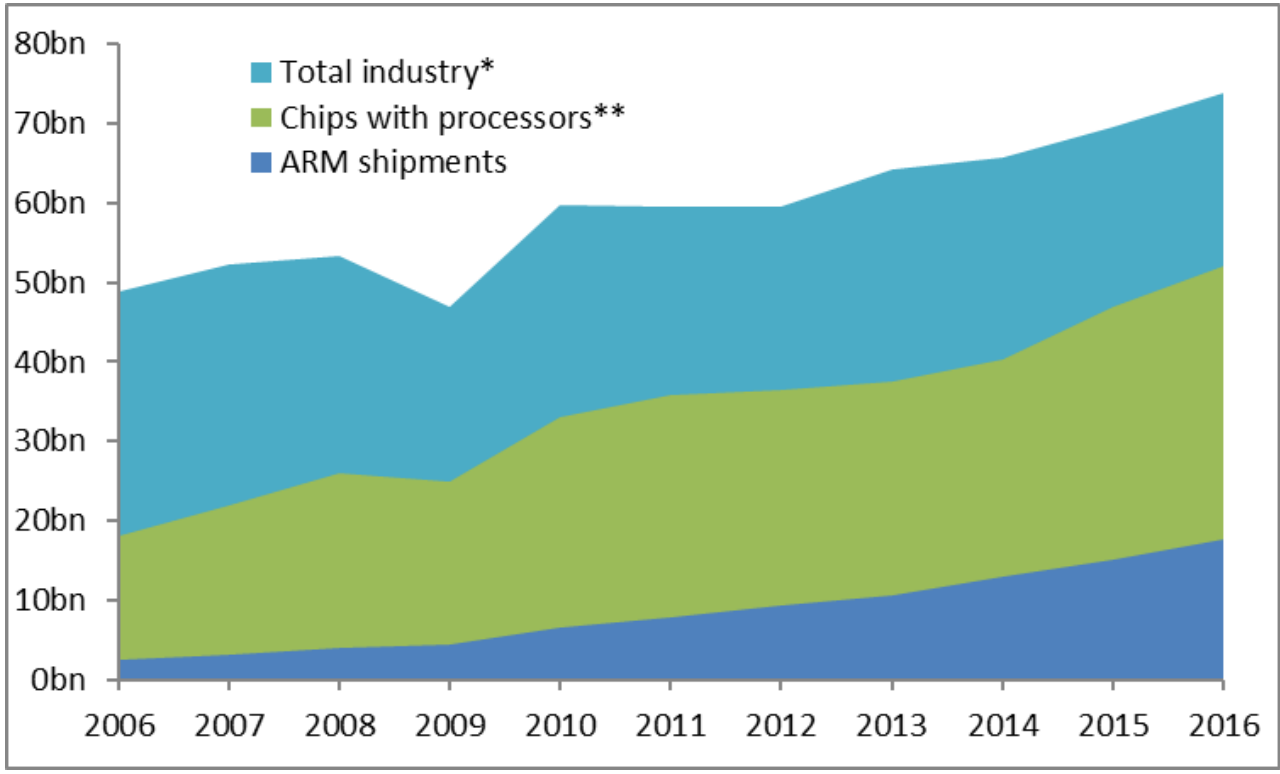


Arm's opportunity continues to broaden

Semiconductor industry continues to grow:
4% by volume, 1% by value over past five years

Proportion of chips with processors is increasing:
70% in 2016

Arm is gaining share within the “chips with processors” segment of the industry:
34% in 2016

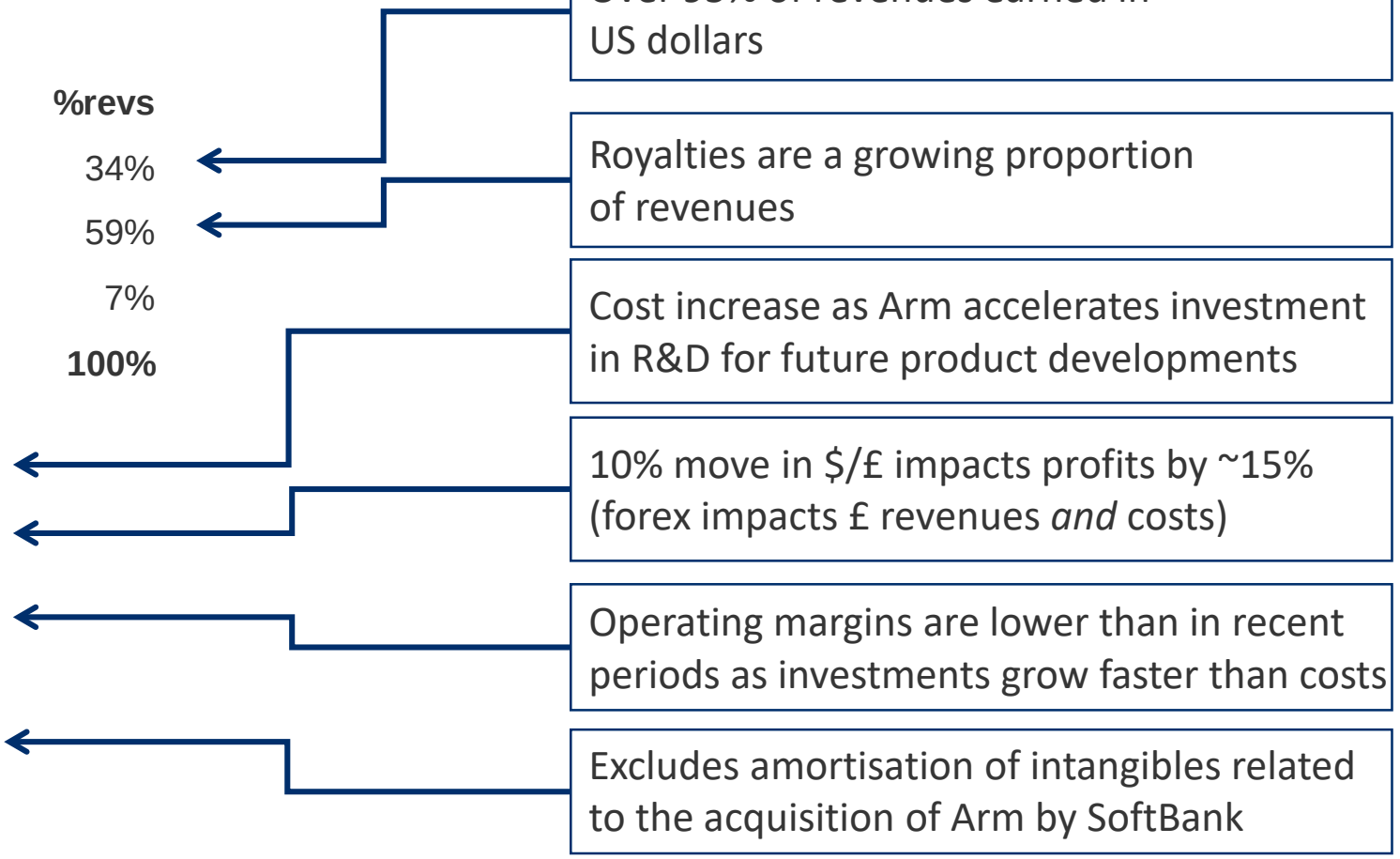


* Data source: WSTS, March 2017 and Arm,
Industry volume excluding analog and memory
** Arm estimates

arm

From revenue to profits

FY 2016 Revenues	$m	£m	%revs
Licensing	601	437	34%
Royalty	974	751	59%
Software and Services	114	83	7%
Total	1,689	1,271	**100%**
Costs (£m)		667	
Adjusted EBITDA (£m)		**604**	
Operating Margin		48%	
Other expenses (£m)		292	
IFRS EBIT (£m)		**312**	



Financial numbers aligned with SoftBank reporting periods (01 April 2016 to 31 March 2017)

Qtr. ending December 2017 – Financial summary

Revenues ($m)	Q3 2016	Q3 2017	Growth
Licensing	229	190	-17%
Royalty	248	297	20%
Software and Services	31	33	6%
Total ($m)	508	520	2%
Revenues (£m)	392	390	-1%
COGS (£m)	12	21	75%
R&D (£m)	92	154	67%
SG&A (£m)	72	122	69%
Costs (£m)	176	297	69%
Adjusted EBITDA (£m)	216	93	-57%
Depreciation & amortisation	13	17	31%
Other operating expenses (£m)	-11	34	-
IFRS EBIT (£m)	214	42	-80%

Licensing can fluctuate quarter to quarter
Q1 up 22%; Q2 down 17%; Q3 up 54% seq.

Royalty revenue growth driven by market share gains and increasing royalty per chip

Nearly 100% of Arm's revenues are in USD
40% of costs are in USD and 40% in GBP

25% increase in total headcount
New remuneration schemes post acquisition

Currency fluctuations lead to mark-to-market revaluation of long-term contracts

YTD IFRS EBIT margin 16% excluding impact of exchange rate fluctuations

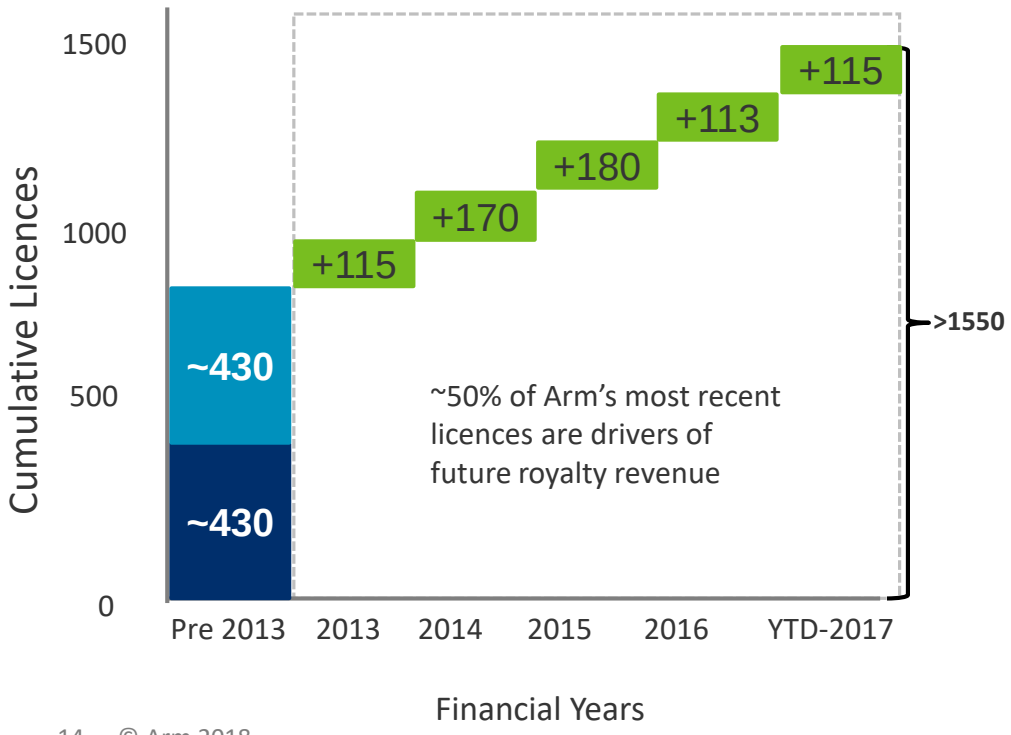
arm

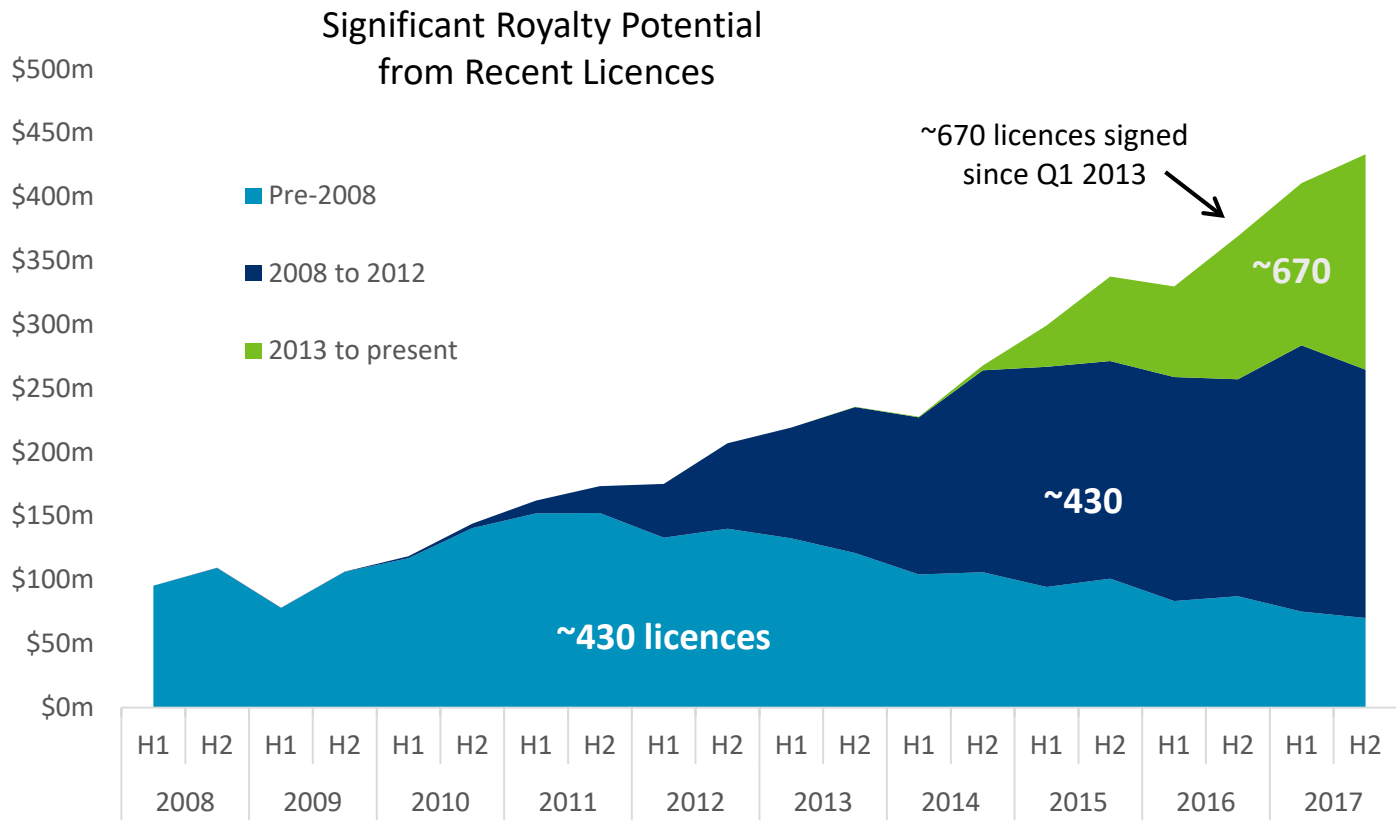
Licensing enables future royalties

Arm signed 115 licences YTD 2017

Arm's current royalty revenues are derived from licences signed many years ago

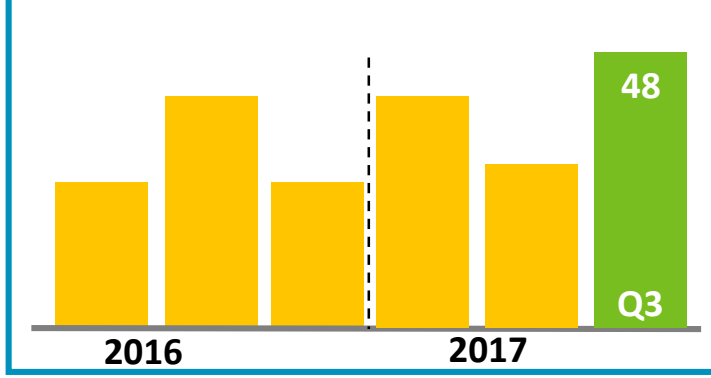
Growing base yields royalty revenues over long period





Qtr. ending December 2017* – Progress against strategy

Licences signed for broad range of end markets

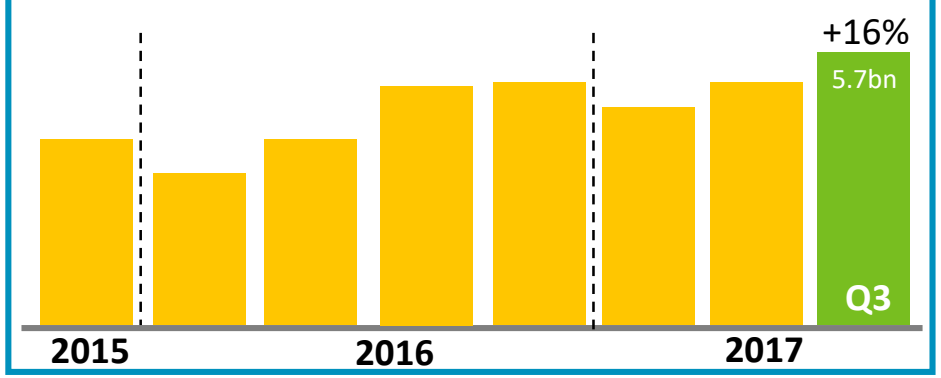


17 Cortex-M
Motor control, IoT and security

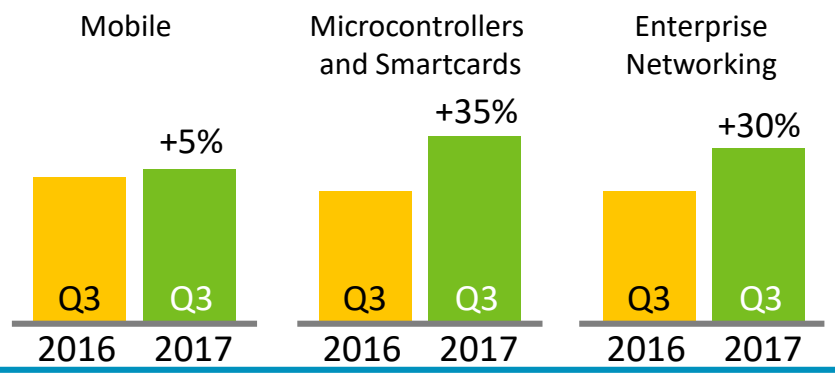
19 Cortex-A
for AI, consumer, automotive

7 Mali IP
for mobile and consumer

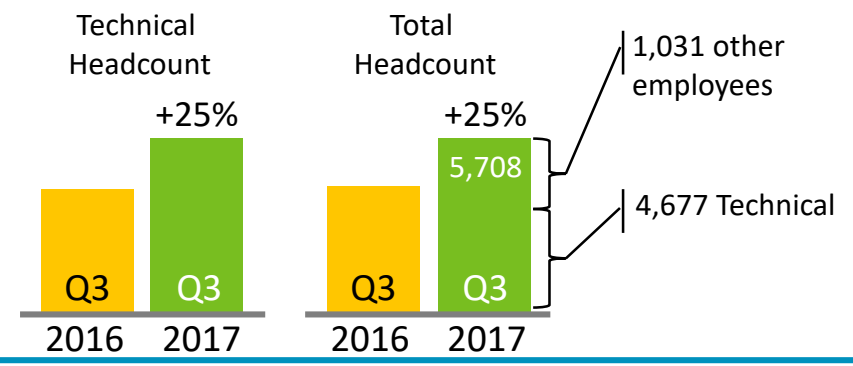
Reported Royalty Units Growing



Key market performance (growth in reported royalty units)



Investing in Future Technology



* SoftBank's financial year runs from April 01 to March 31.

arm

Arm's expanding opportunity

	Share 2016*	TAM 2016	TAM 2025
Mobile Application Processors	90%	$20bn	$30bn
Networking Infrastructure	17%	$13bn	$18bn
Servers	<1%	$15bn	$20bn
Embedded Intelligence	30%	$23bn	$40bn

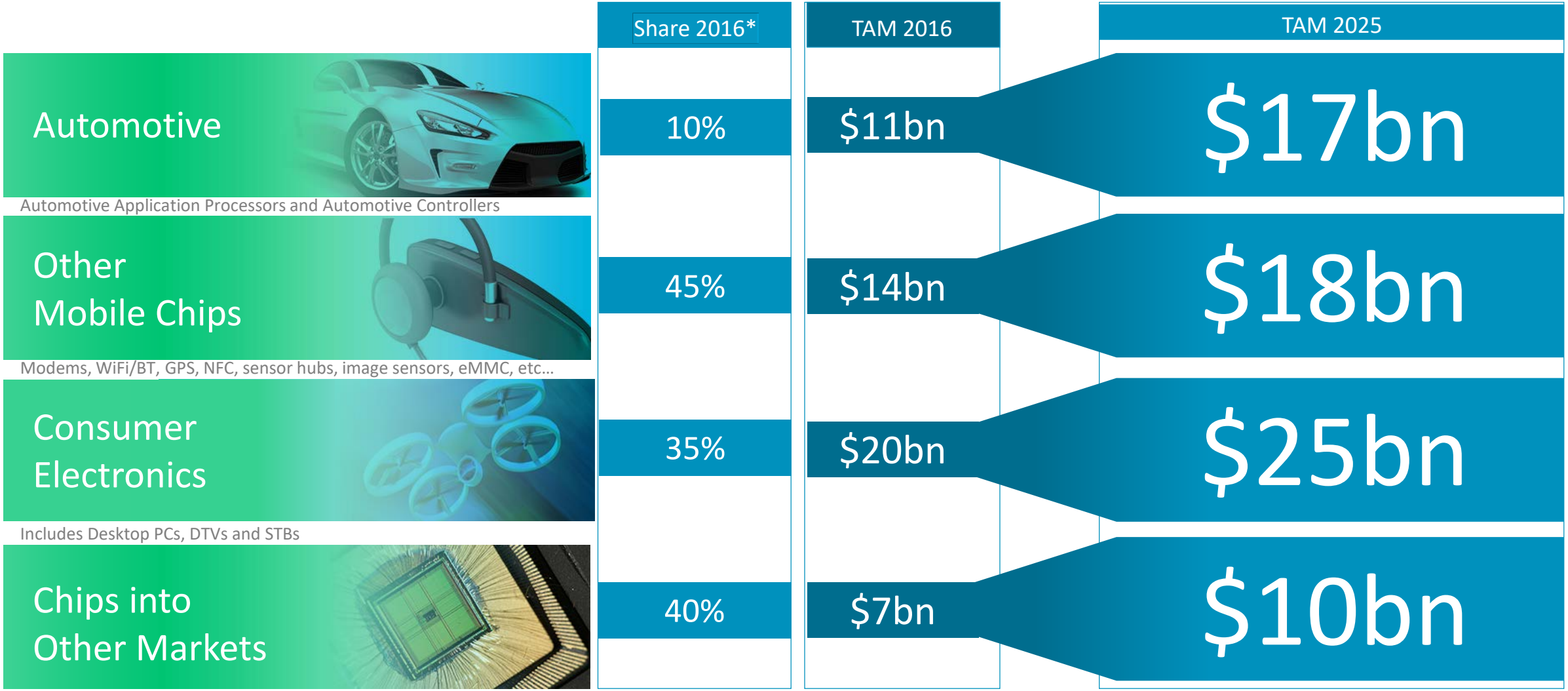
Includes smartphones, tablets and laptops

Includes microcontrollers, smartcards and non-mobile connectivity. Excludes automotive

* 2016 Arm Market Share by Volume
† Total Available Market (TAM)

arm

Arm's expanding opportunity



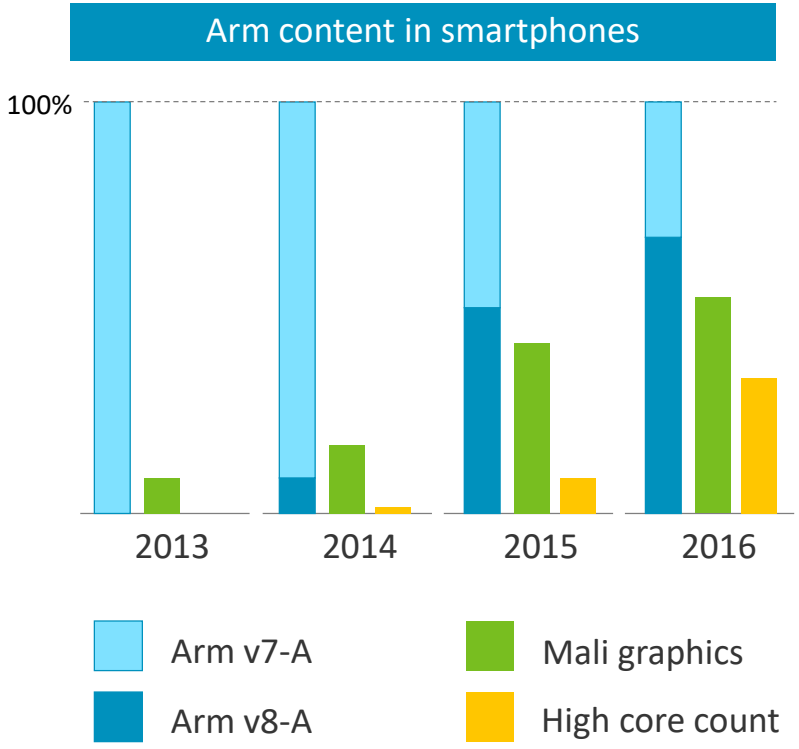
* 2016 Arm Market Share by Volume
† Total Available Market (TAM)

arm

Arm's opportunity in mobile and consumer

Continued growth from advanced technology and new form factors

Growth has been driven by advanced Arm technologies



Consumers pay a premium for performance and features

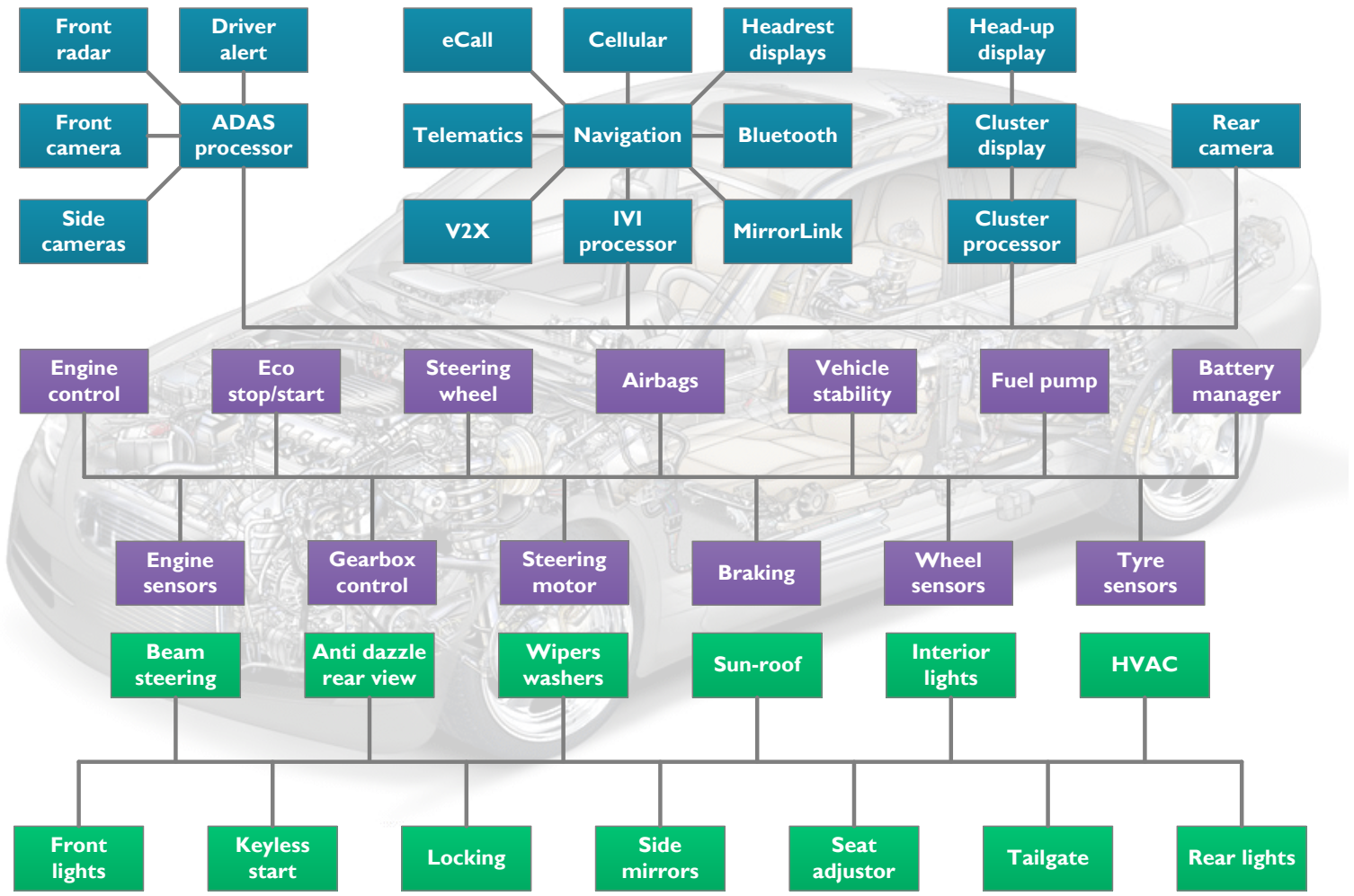
$60 of Arm-addressable chips in the latest high-end smartphones

Investment in smartphones has led to new form factors

arm

Arm's opportunity in automotive

Functional safety, consolidation, partitioning, performance, power, cost



Autonomous driving, ADAS, Cluster, Connectivity

Powertrain, chassis

Body electronics, sensors, actuators, communications

arm

Arm's opportunity in servers

Targeting 25% share (~1% share today)

Arm processors are suitable for >50% of data centre workloads

Microsoft has ported the core components of Windows Server onto Arm

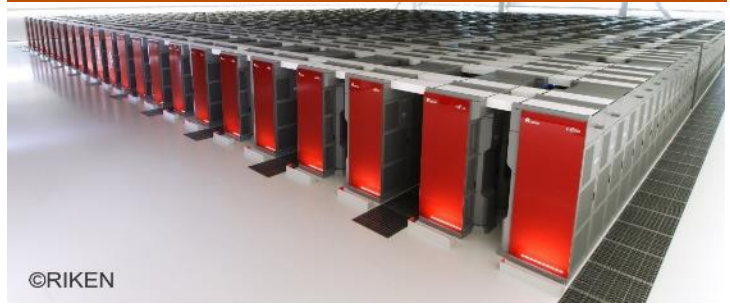
Microsoft Azure

- Search and Indexing
- High-performance storage
- Machine learning and big data
- Web servers, database servers
- Email, PaaS services

Arm v8-A selected for High Performance Computing

Barcelona Supercomputer Centre selects Arm v8-A for Mare Nostrum 4

Fujitsu and RIKEN select Arm v8-A for the Post-K supercomputer



Now shipping into enterprise applications

Arm v8-A server chips are shipping in volume into storage appliances.

arm

Arm's opportunity in networking

Targeting >50% share of chips in next-generation networks

Future networks will be based on open source collaboration

OPNFV

- Network Function Applications
- OpenStack
- OpenDaylight
- Linux
- Hypervisors
- Open vSwitch
- OpenDataPlane

Networking software is being optimised for Arm-based chips

OpenDataPlane project members

Texas Instruments, arm, Cisco, ENEA, Cavium, Nokia, Wind River (An Intel Company), Broadcom, Ericsson, NXP, MontaVista, ZTE, HiSilicon

Accelerating data comms from server to server

"When you offload to hardware, you run roughly a tenth the latency, a tenth the power, a tenth the cost. Here's some great news: we're in the semiconductor business!"

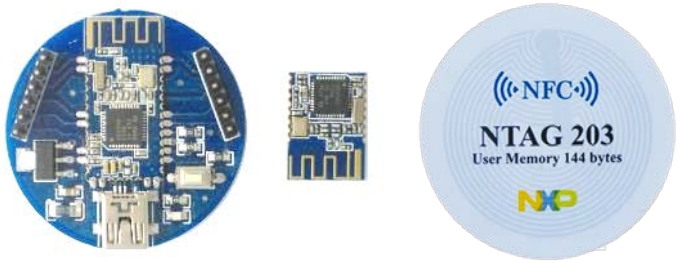
James Hamilton, VP and Distinguished Engineer, AWS

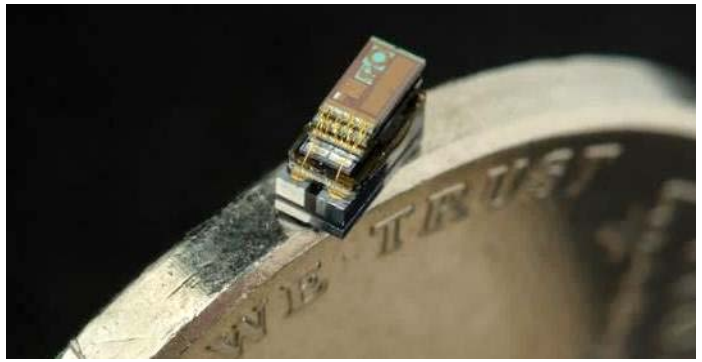
arm

Arm's opportunity in IoT – silicon IP

The architecture of choice for IoT developers

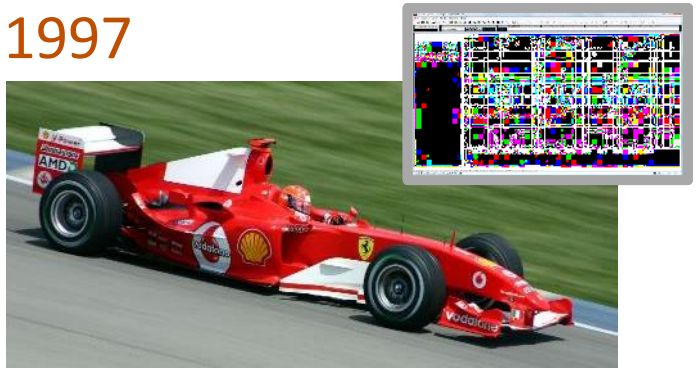
Cortex-M processors enable secure, low-cost IoT devices





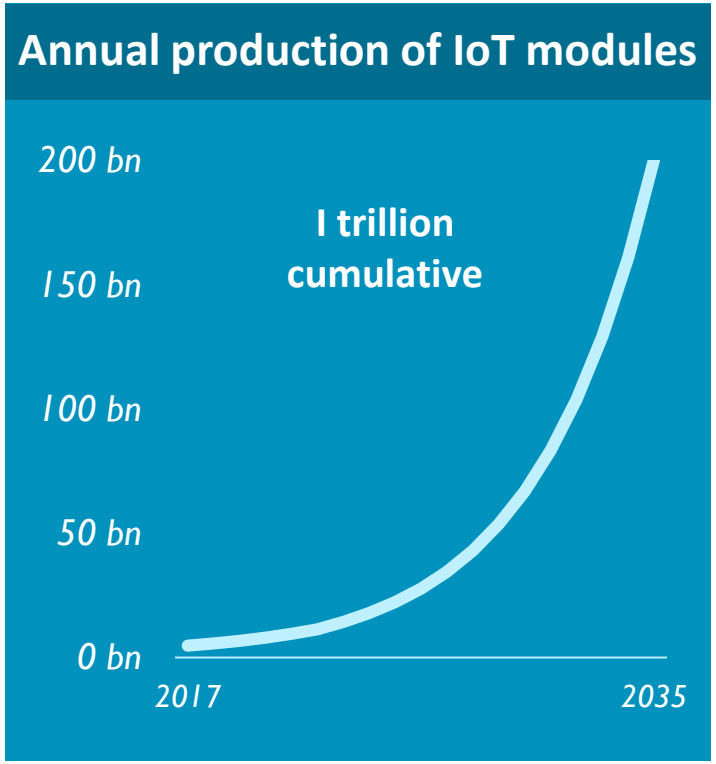
High-value tech is now available at consumer price points

1997



2017

Every thing will be connected

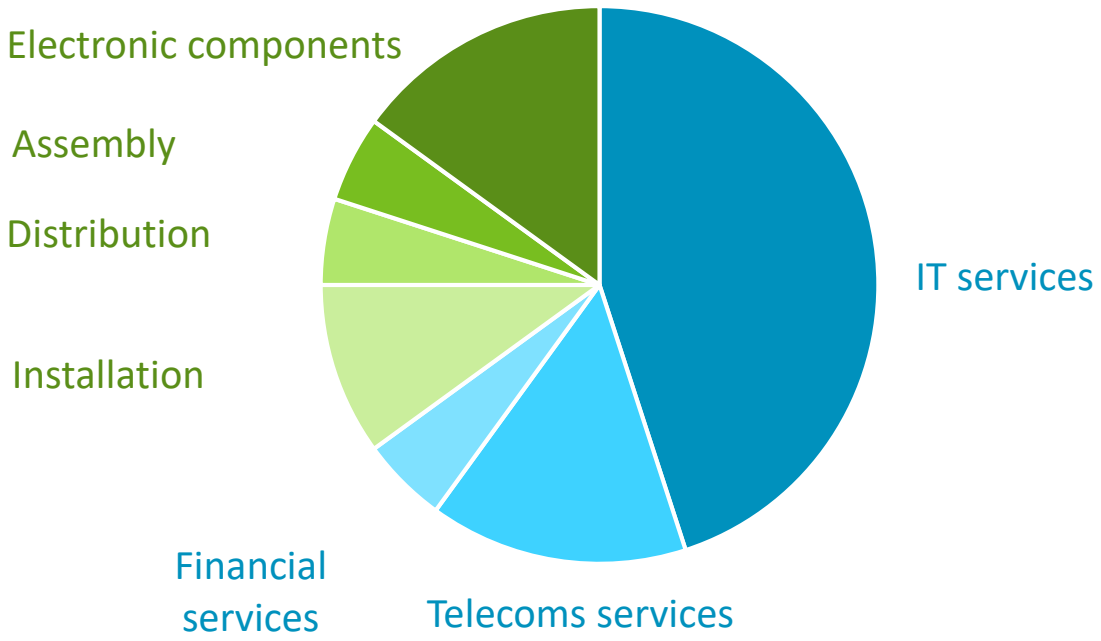


arm

Arm's opportunity in IoT – software and services

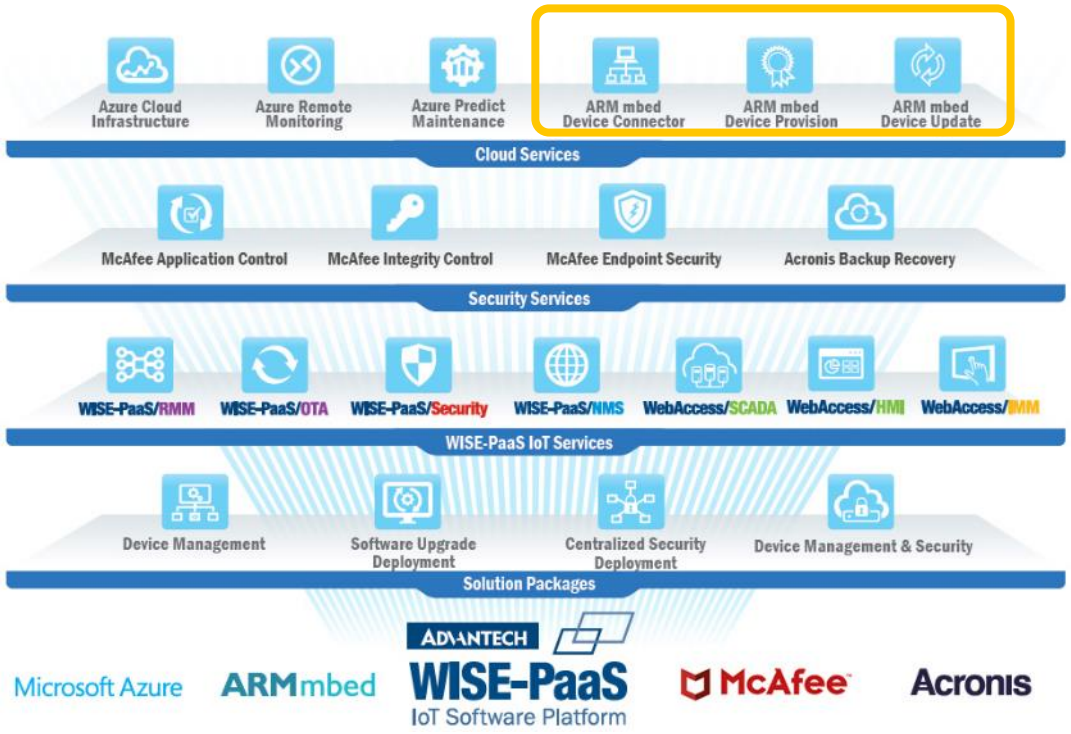
Investing to create new revenue streams

Arm forecasts a $1 trillion TAM for IoT technology in 2035



The TAM refers to IoT technology (electronics, software, services) only, it excludes the value of the 'things' that contain the IoT modules

Arm's IoT platform is being integrated into OEM lifetime management services



arm

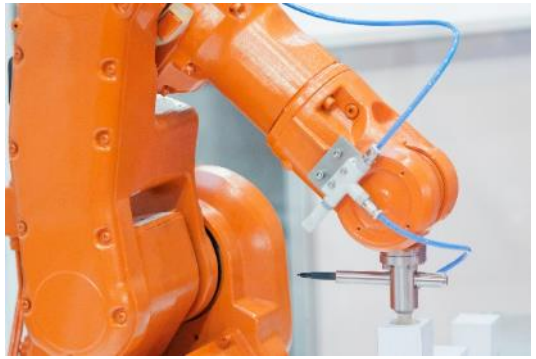
Artificial intelligence in every device

Learning in the cloud, inference at the edge

Mobile

Automotive

Robotics



Drones

IoT

Home, surveillance & analytics

VR/MR

Shipping & logistics

arm

Machine learning and computer vision

The key workloads for intelligent computers

Widely-available software tools give developers access to ML

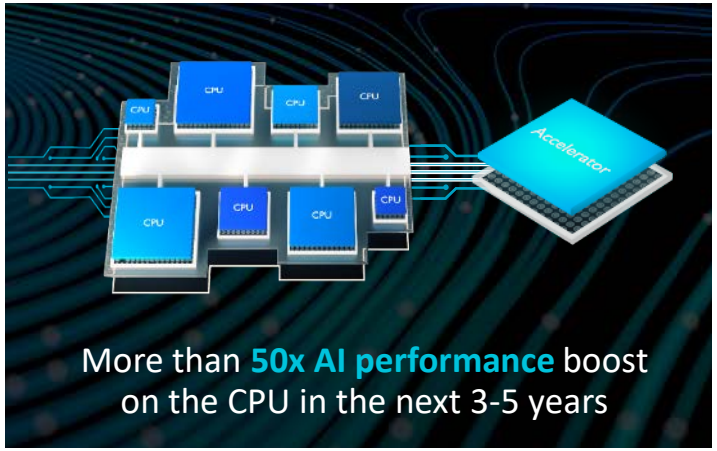
TensorFlow

Caffe2

arm COMPUTE LIBRARY

OpenCV

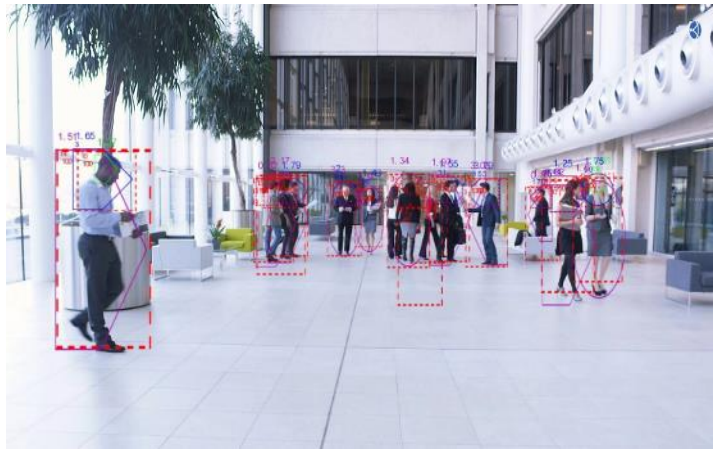
Optimise for performance, cost and programmability



arm DynamIQ

The latest Arm v8-A CPUs implement new instructions for ML calculations, and increase the memory bandwidth between CPUs and accelerators.

Stable algorithms can be hardwired into accelerators



arm COMPUTER VISION

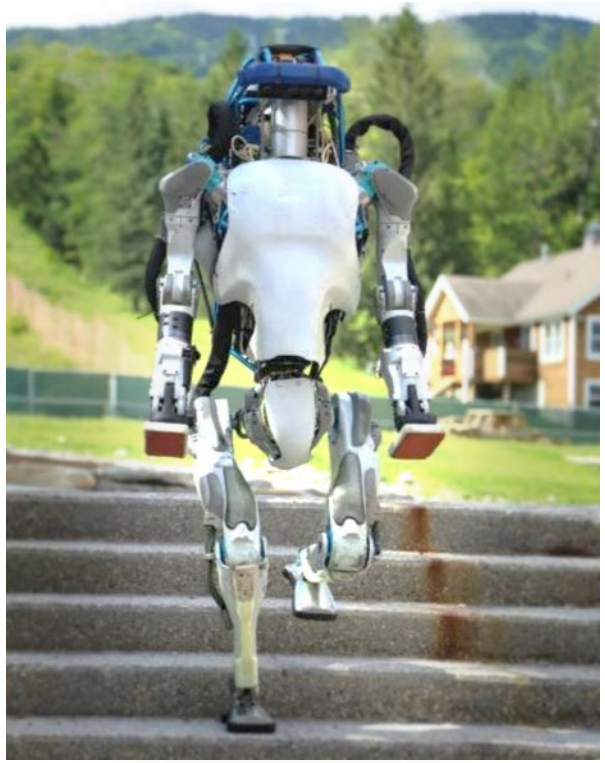
Arm's silicon IP for computer vision identifies objects in moving images. It is smaller and more power efficient than equivalent software implementations.

arm

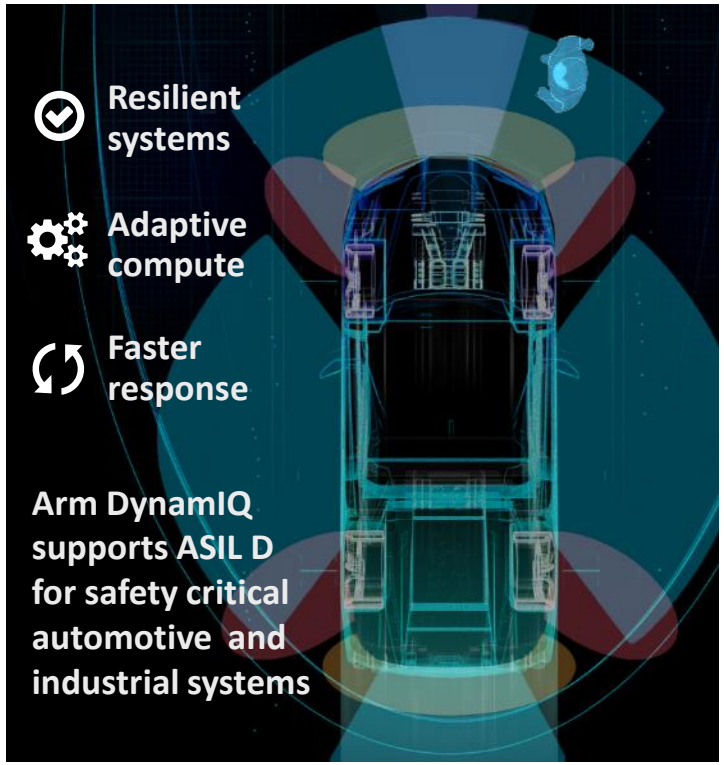
Autonomous machines

Advanced compute is moving to the physical domain

Robots and autonomous cars will operate alongside people



The physical domain requires stringent safety standards



Vehicle electrification will force the pace of change

- All future models from Volvo will have electric or hybrid engines
- UK and France have announced plans to phase out petrol vehicles by 2040

Augmented reality

New experiences and new user interfaces

Seamless interactions between humans, machines and data

Augmented reality (AR) overlays digital information onto the user's view of their immediate surroundings.

AR relies on advanced display technologies and new techniques for reading user input, such as 3D sensors.

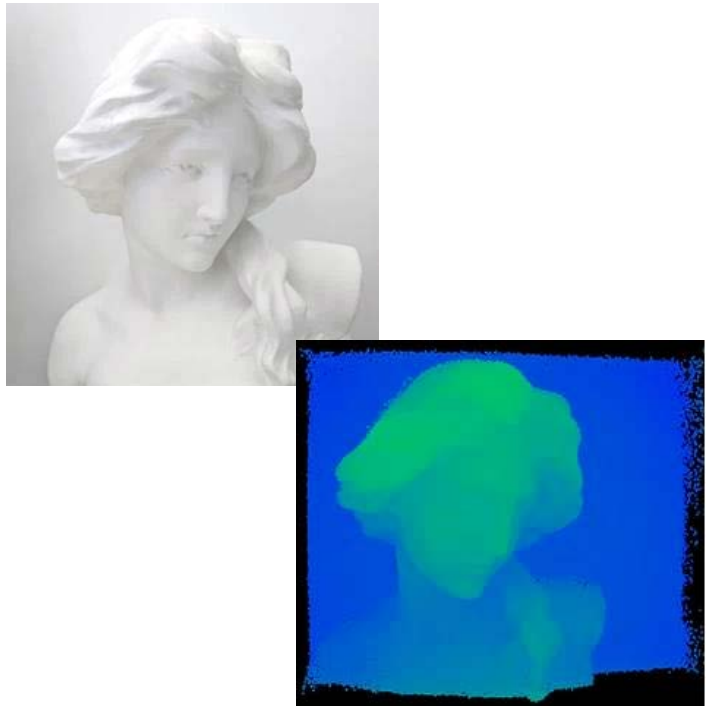
A demanding roadmap for mobile GPU performance

Latency: <16ms
to avoid motion sickness

Frame-rate: >60 Hz
for a smooth viewing experience

Resolution: 2K minimum
for realistic images

Driving innovation in displays, 3D sensors and computer vision



Source: Sony

arm

Hyperscale cloud and connectivity

Infrastructure for the information revolution

Enterprise compute is moving to the cloud

Microsoft Azure

Alibaba Cloud

amazon web services™

腾讯 Tencent

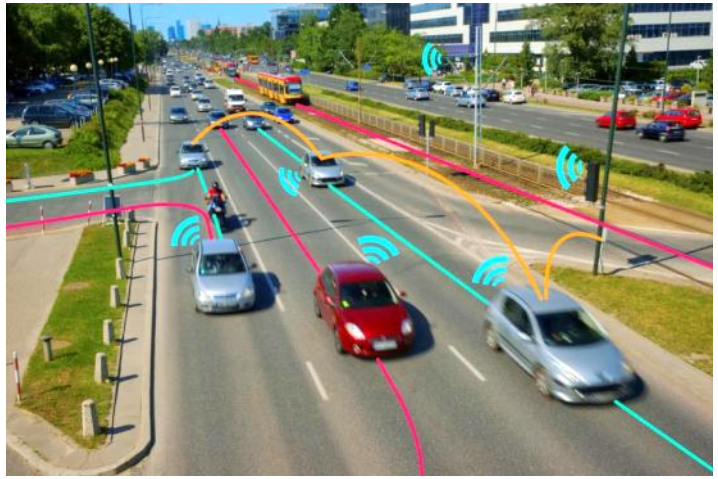
Google Cloud Platform

Insatiable demand for data is driving new standards

Performance targets for 5G networks

- **1000x** data volume per km2
- **1000x** connections per km2
- **100x** user data rate
- **80%** reduction in latency
- **80%** reduction in opex
- **90%** reduction in energy
- **99%** reduction in time to deploy

Workloads will be shared across devices, base stations and servers



Autonomous vehicles will be controlled by computers in the car, in neighbouring cars, in nearby base stations and in remote datacentres

arm

Information security

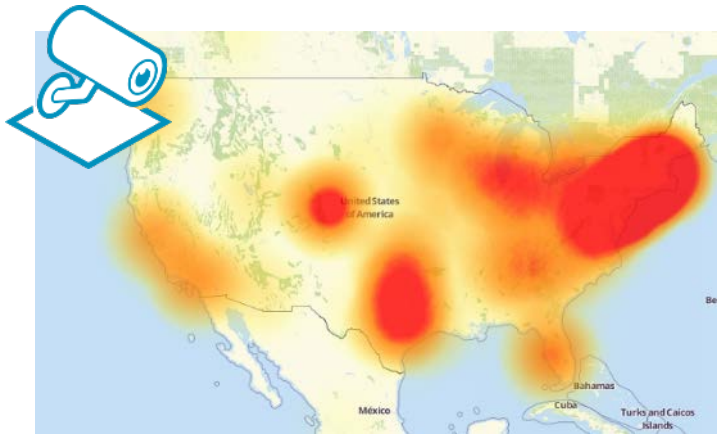
The fundamental component of all connected systems

Secure systems are built on a hardware root of trust

arm TRUSTZONE

– Secure Identity – Software Identity –
– Secure Boot – Isolation – Authentication –
– Encryption – Tamper Detection –
– Trusted Execution Environment –

Devices must be kept secure with regular software updates

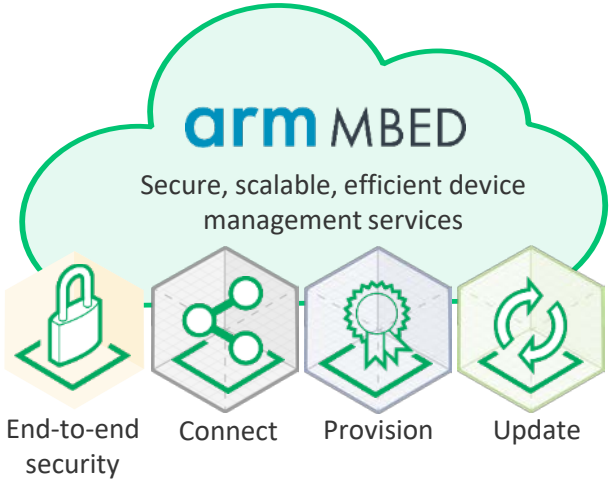


REUTERS

Chinese OEM to recall up to 10,000 webcams after hack

Mirai Botnet attack, October 2016

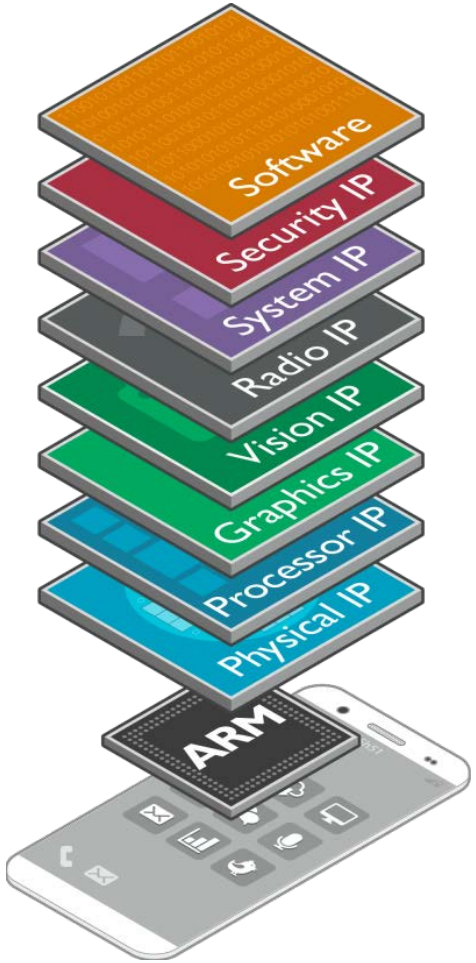
Good security is inexpensive to implement and costly to crack



Arm mbed Cloud takes care of complex security tasks in large-scale IoT networks. This allows Arm's OEM customers to concentrate their development on features that differentiate their product offering.

arm

Arm's current business



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

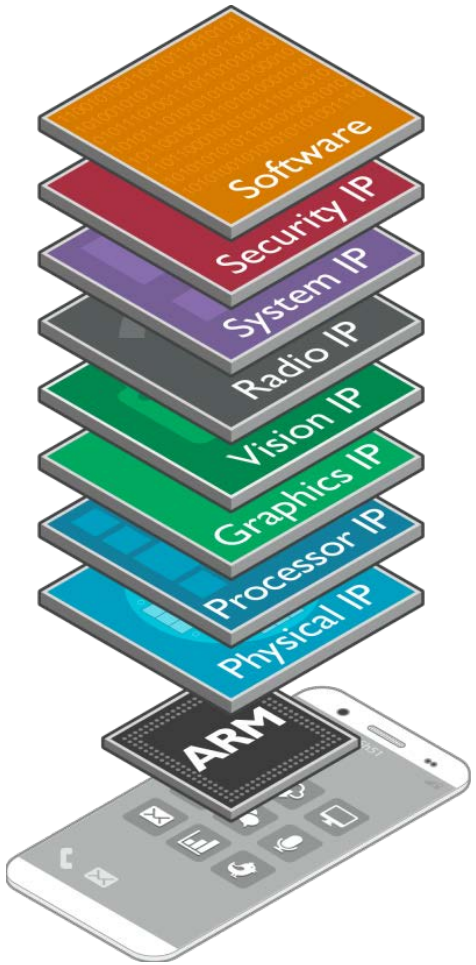
Our partners combine Arm IP with their own IP to create complete chip designs

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**

arm

Accelerating investment to increase share gains



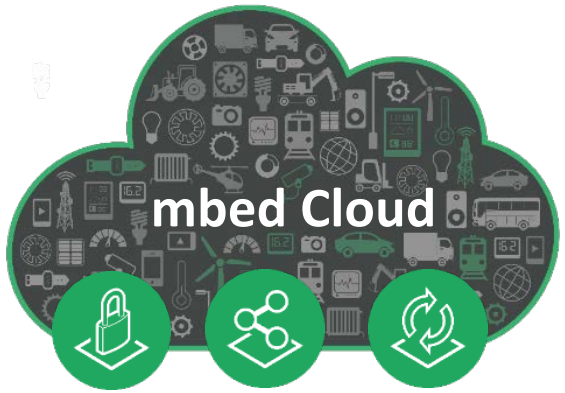
Generating

$600m

annualised free cash flow

Investing to create new revenue streams

- mbed Cloud SaaS business
- Early-stage investment but many years in research
- Securely connect any device into your network, using any communications technology, supporting any cloud platform
  - Cloud provision: secure device identification, on-boarding and configuring
  - Cloud connect: manage your IoT networking using standard-based comms
  - Cloud update: remotely update firmware across all your devices

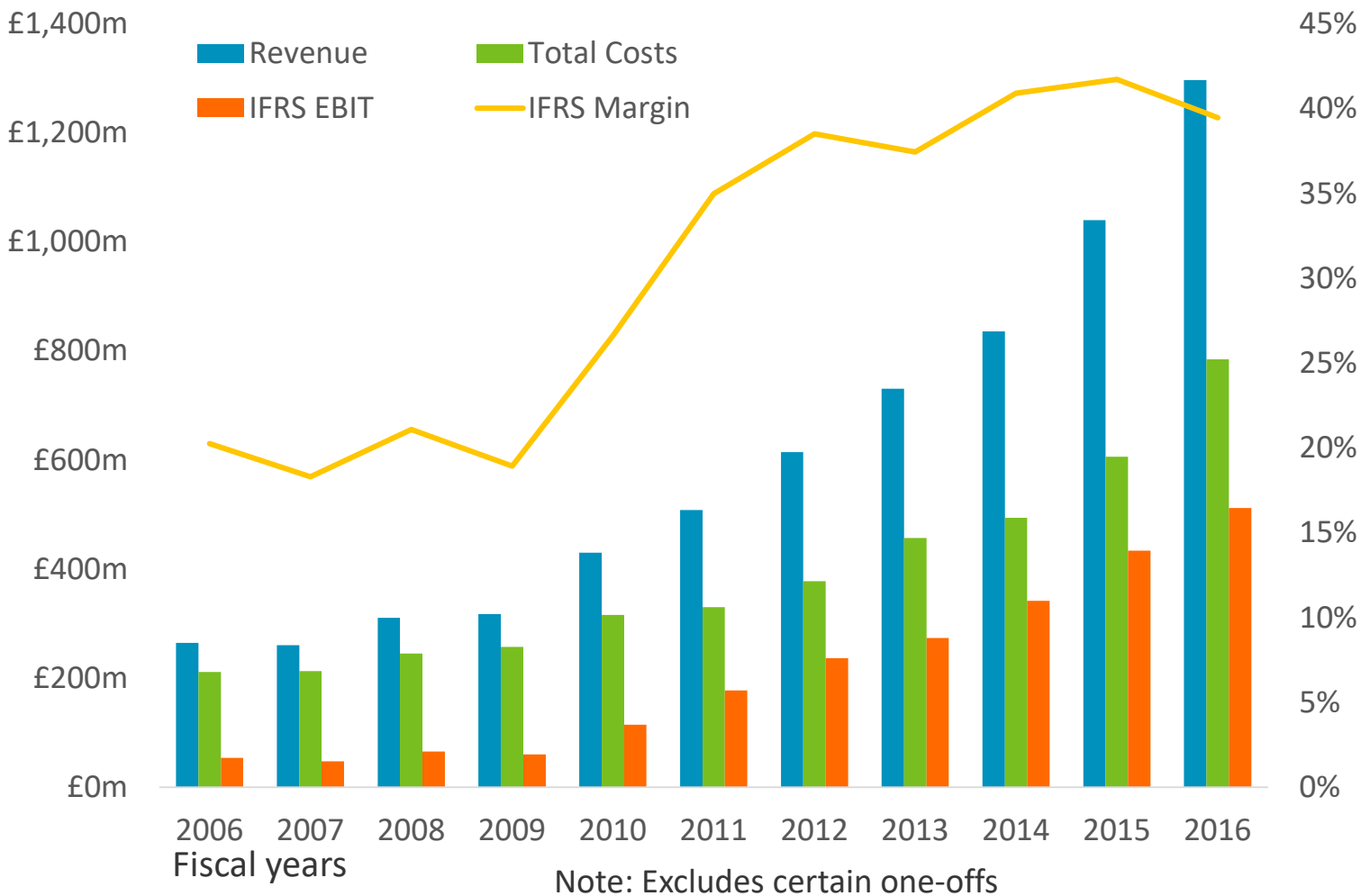


mbed Cloud Partners

ADVANTECH TOSHIBA ZEBRA GE Lighting

arm

Revenues, profits and profitability



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

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

Profits grew and profitability edged over 40%

At the start of the next phase of investment Arm expects costs to grow faster than revenues

This should yield even greater profits in the future

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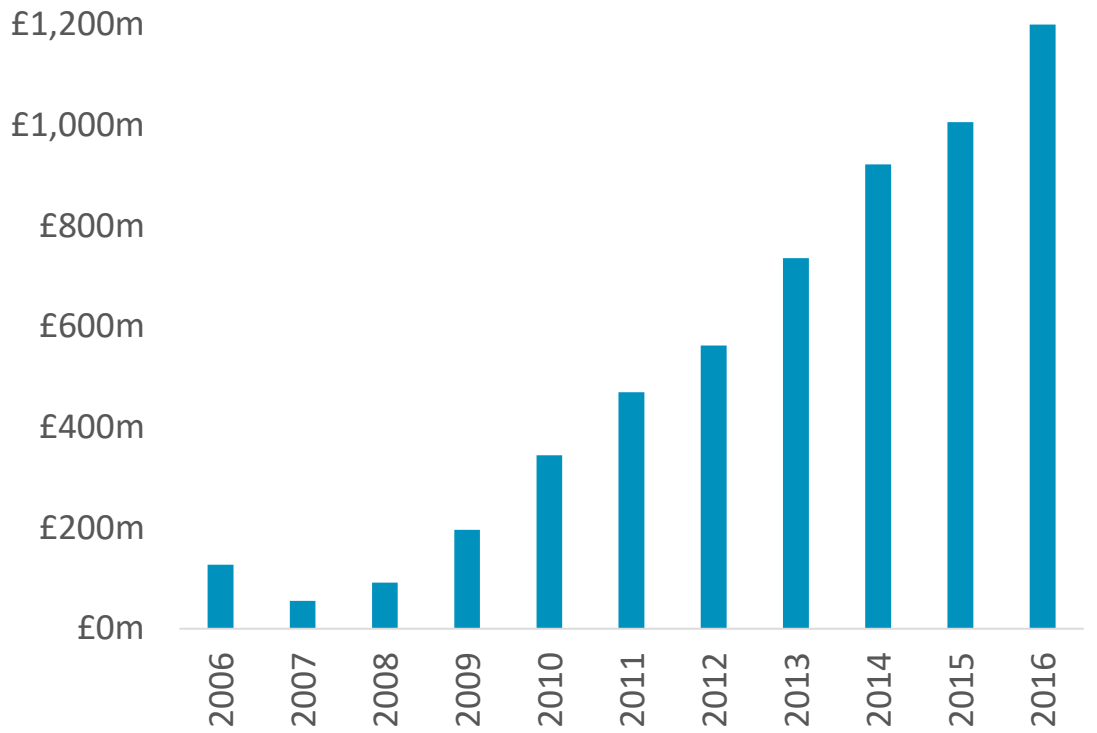
Investment philosophy

“Now is the time to be sowing, not harvesting”

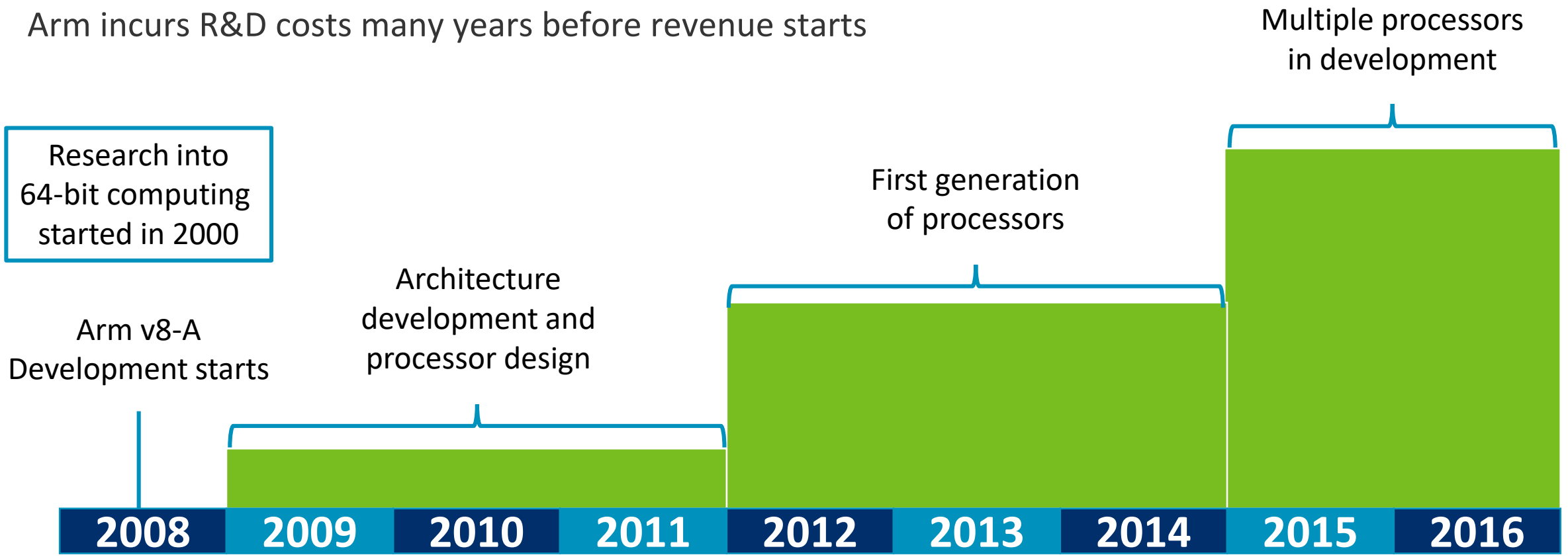
- Rate of investment is discretionary and under Arm's control
- SoftBank has asked Arm to accelerate investments and to increase risk appetite
- All costs are expected to be financed from IP business’ revenue streams
- During this accelerated investment phase, costs are expected to grow faster than revenues

Arm has over £1.2bn of net cash and no debt



Return on Investments – Arm v8-A case study

Arm incurs R&D costs many years before revenue starts



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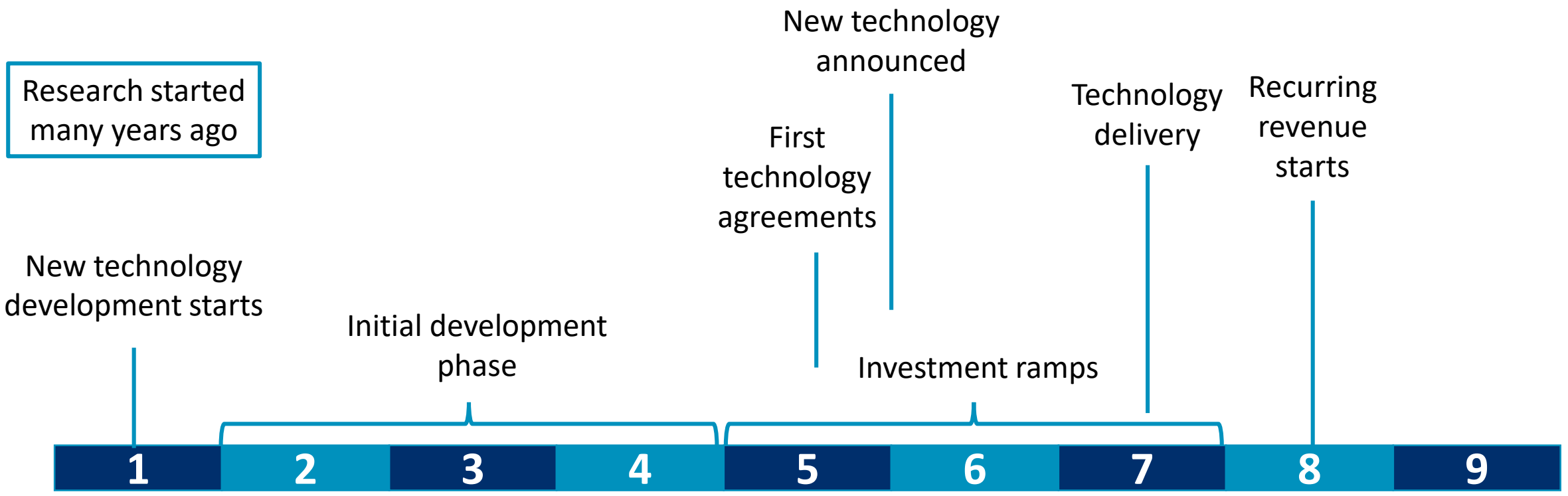
Return on Investments – General case

Arm incurs R&D costs many years before revenue starts



Revenue continues for many years after the investment phase, yielding high profits over time

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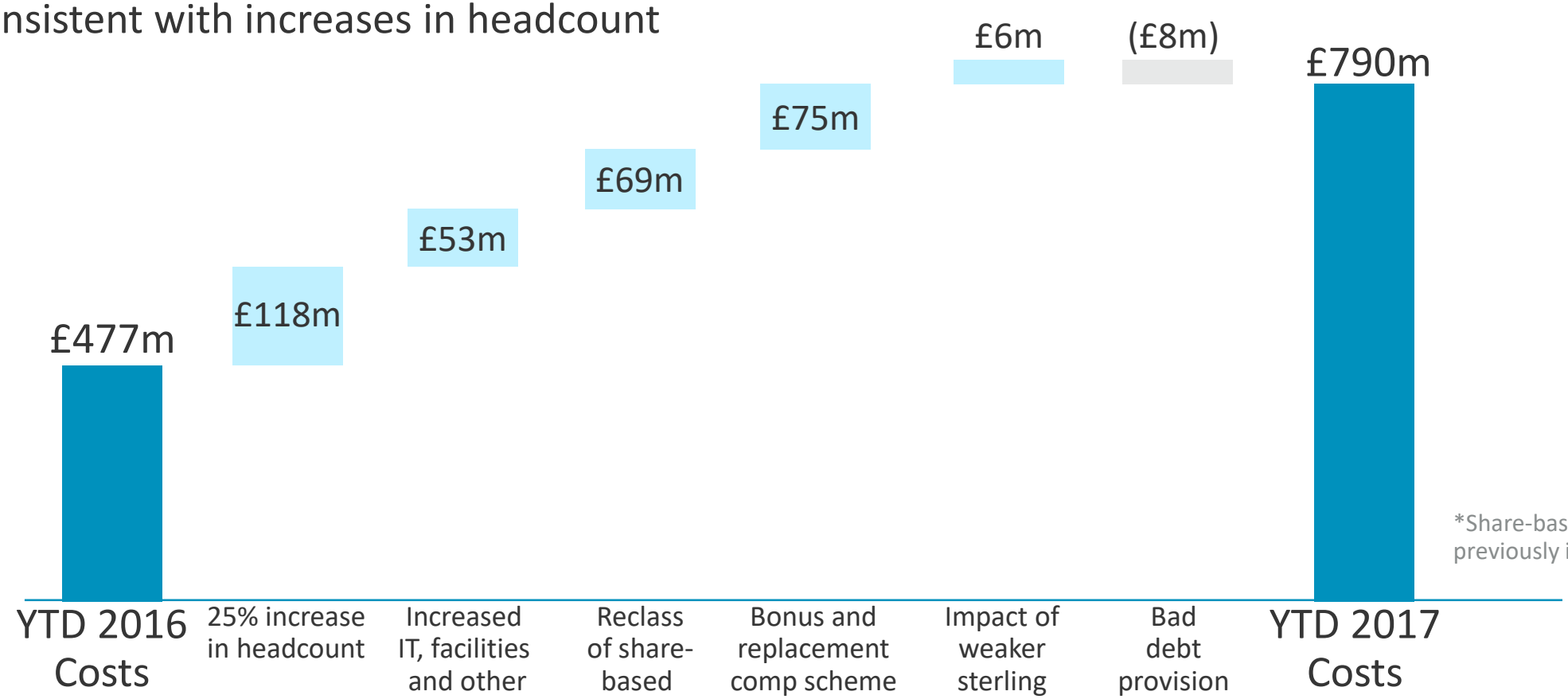
Investing in people, infrastructure to create new products

Costs are higher in 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"

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