



# Arm in Automotive

Akraino Automotive Workshop

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Automotive Business, IP Products Group

July 2021

# Sparking the World's Potential



Semiconductor IP Business

The global leader  
in the development  
of licensable  
compute technology

- R&D outsourcing for  
semiconductor companies

Focused on freedom  
and flexibility to  
innovate

- Technology reused across  
multiple applications

With a partnership  
based culture  
& business model

- Licensees take advantage  
of learnings from a uniquely  
collaborative ecosystem

+ **1,910**  
licenses, growing by  
100+ every year

+ **530**  
licensees  
Industry leaders and high-growth  
start-ups; chip companies and OEMs

+ **180+bn**  
Arm-based chips shipped  
to-date

+ **23.7bn**  
Arm-based chips shipped in  
2020

# The cars of the past

Clear value chain

Gasoline or Diesel

OEM – Tier 1 outsourcing

Many single-function ECUs

Deeply embedded software

Extensive cabling

Limited driver assistance



# The transformation underway to cars of the future



Software-defined vehicle

Electrification

Emerging OEMs

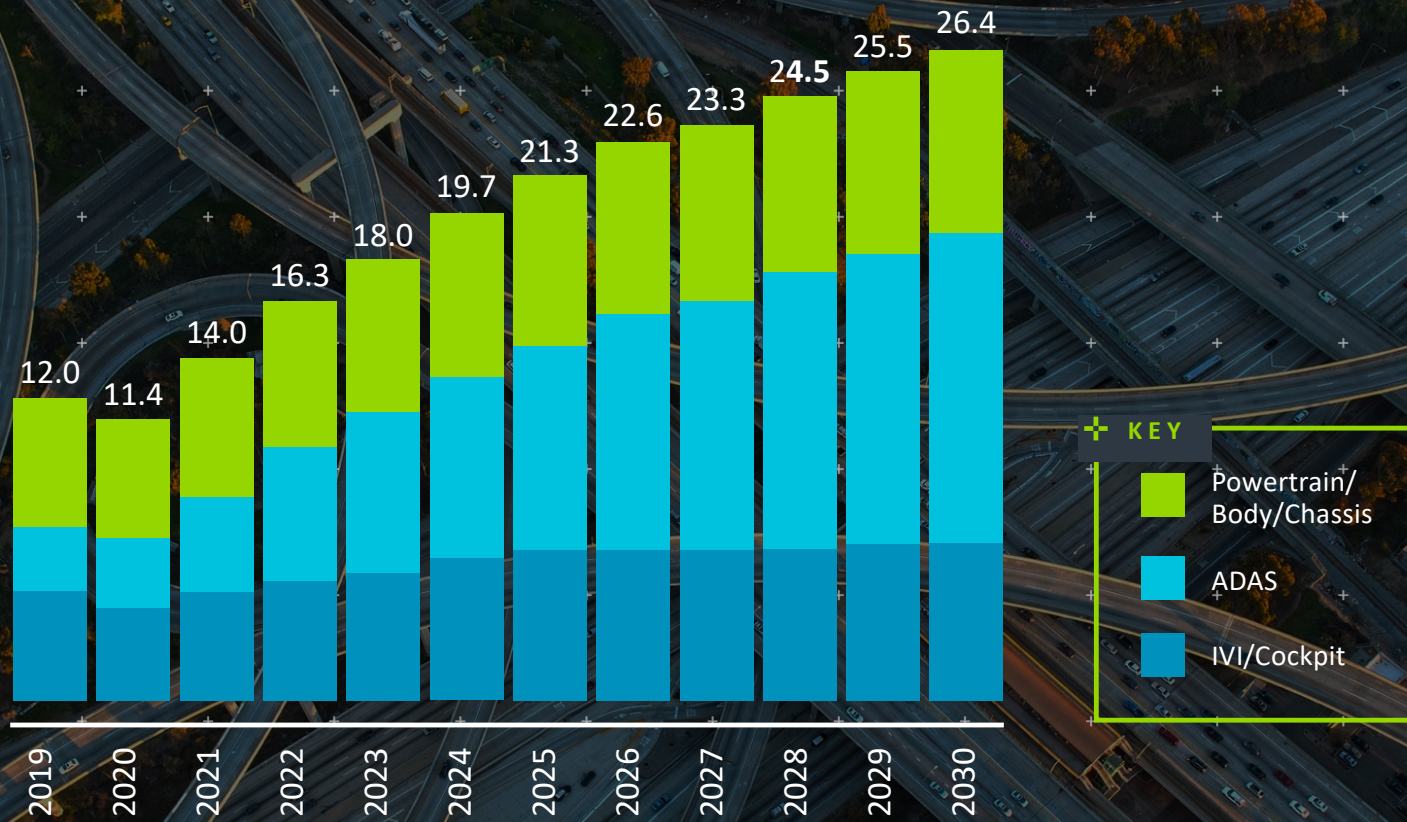
Established OEMs evolution

ECU consolidation

Autonomous driving

Cloud service providers

# Automotive Silicon content is growing rapidly



# Addressing key requirements in Automotive systems

## Key requirements



Software-defined vehicles



Application consolidation



High performance compute



Energy efficiency

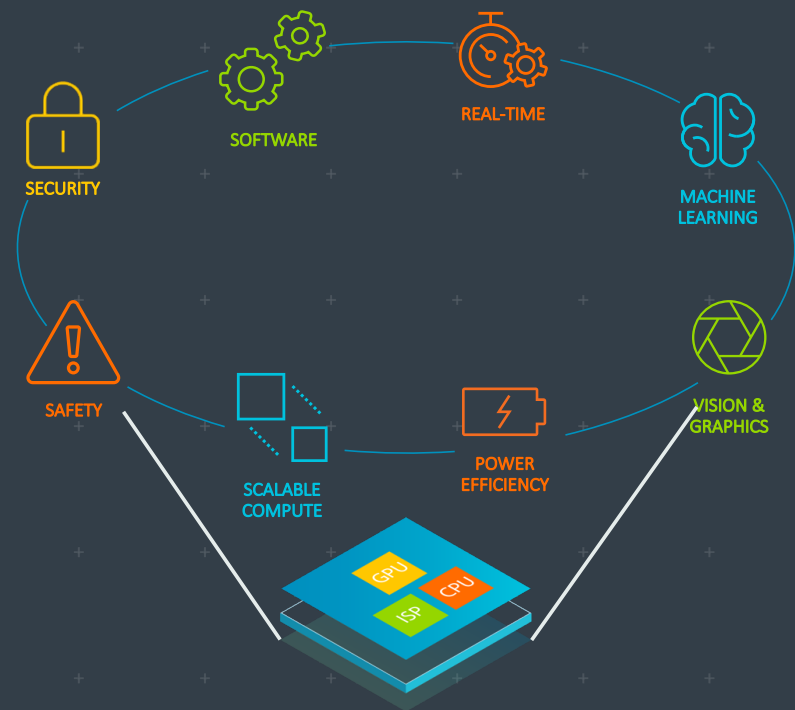


Richer user experiences



Functional Safety

## Key capabilities

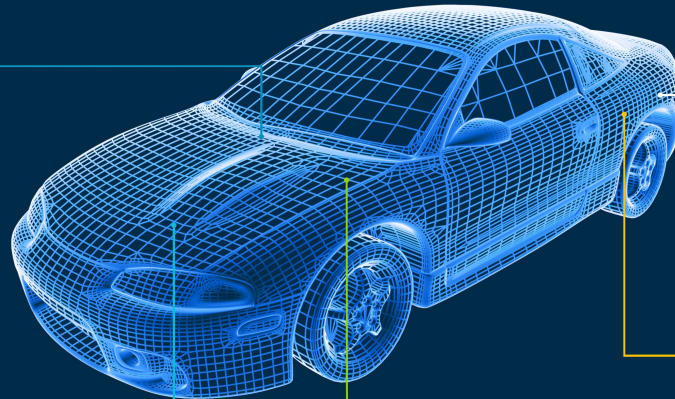


# Arm solutions span the full range of automotive systems

## IVI, Dashboard & Cockpit



- + Cortex-A78AE or Cortex-A76AE or Cortex-A55
- + Cortex-R52
- + Mali-C71AE Camera
- + Mali-G78AE or Mali-G76 Graphics
- + Cortex-M55 or Cortex-M33
- + Software Test Libraries



## Body and Chassis

(including Domain Controllers)



- + Cortex-A53
- + Cortex-R52
- + Cortex-R5
- + Software Test Libraries
- + Cortex-M7
- + Cortex-M55
- + Cortex-M33
- + Cortex-M0+

## Powertrain



- + Cortex-R52
- + Cortex-M7
- + Cortex-M0+
- + Cortex-R5
- + Cortex-M4
- + Software Test Libraries

## ADAS

(including Domain Controllers)



- + Cortex-A78AE or Cortex-A65AE or Cortex-A55
- + Cortex-R52
- + Mali-C71AE Camera
- + Mali-G78AE or Mali-G76 Graphics
- + Cortex-M55 or Cortex-M33
- + Software Test Libraries

## Sensors

(including ADAS)



- + Cortex-A53
- + Cortex-R5
- + Cortex-M55
- + Cortex-M33
- + Software Test Libraries
- + Cortex-R52
- + Cortex-M7
- + Cortex-M0+
- + Ethos-U55 NPU

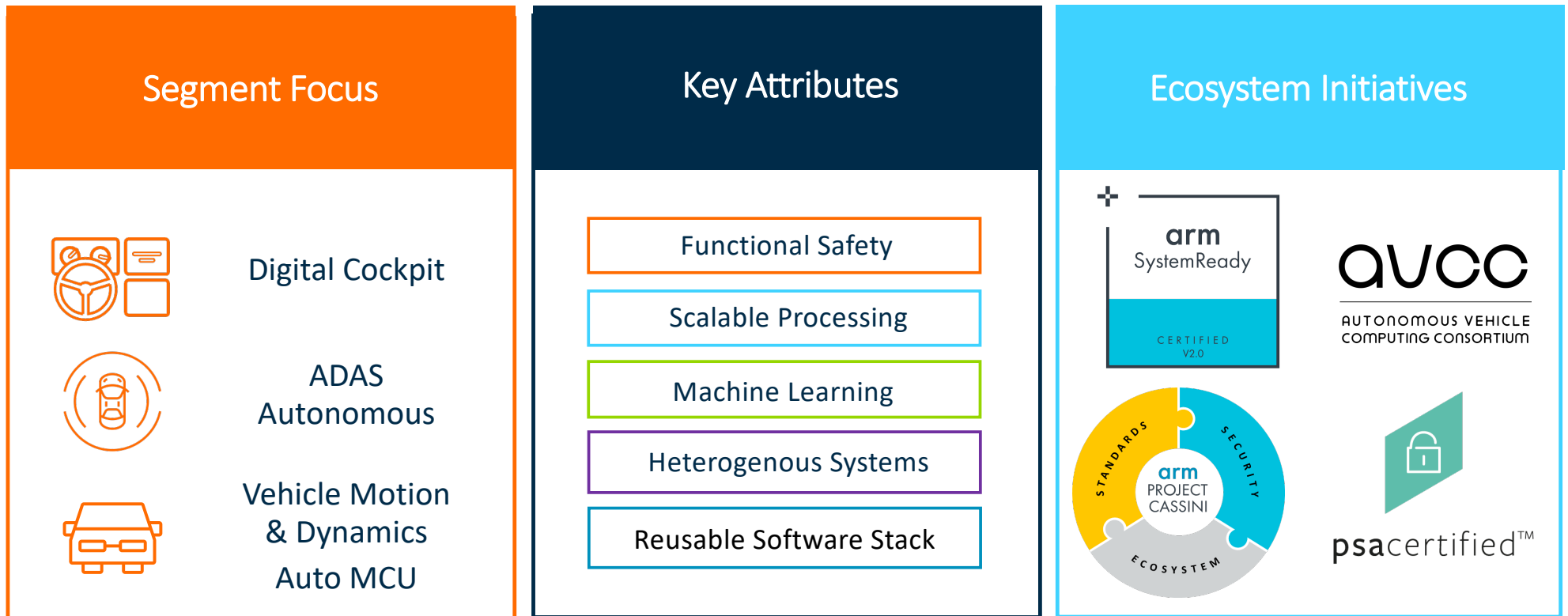
Continuously supporting the automotive industry since **1996**

**15** Top automotive chip makers license Arm IP

**>60%** Share of all Infotainment & ADAS application processors

# Dedicated investment in Automotive segment

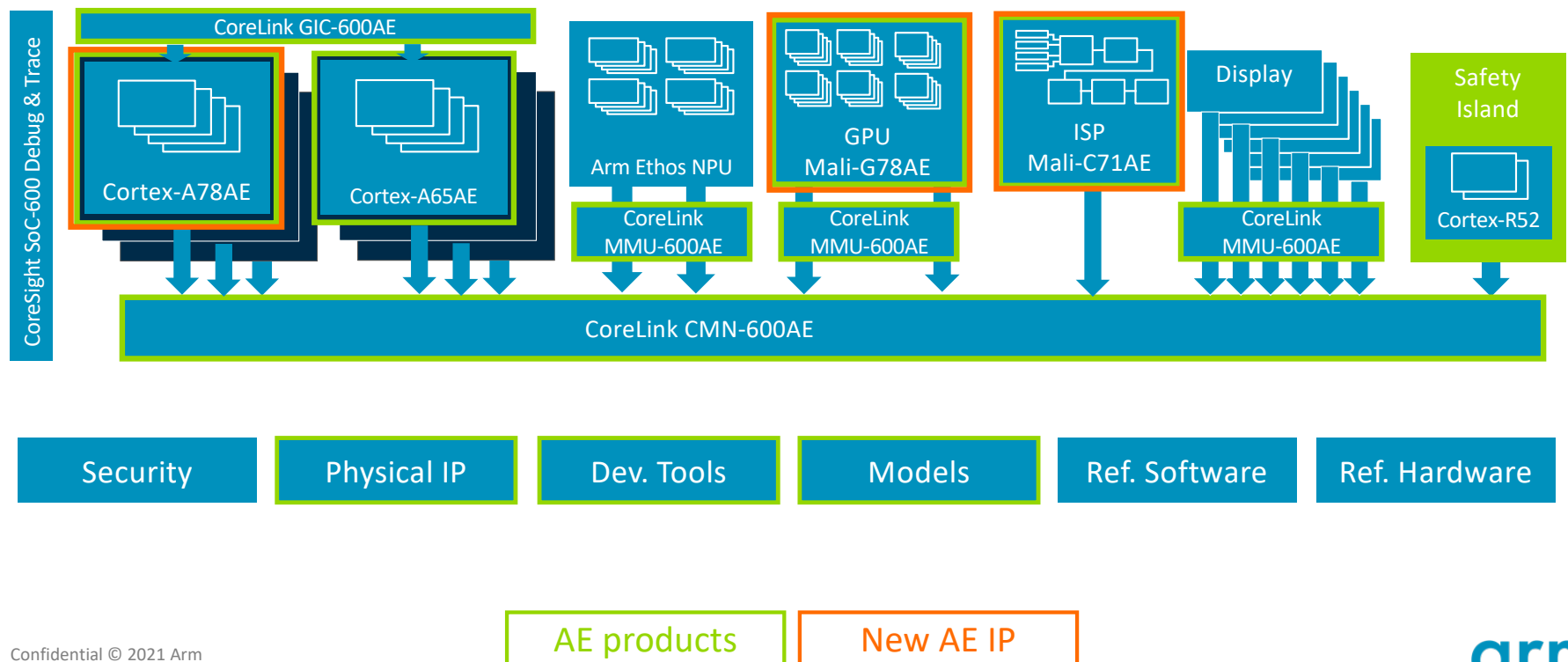
## Arm's 3-pillar approach





# A comprehensive range of technologies and tools

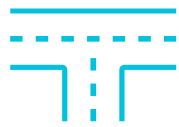
## Example central compute sub-system



# Arm's growing "AE" IP Portfolio and Safety Ready



Uniquely designed for **automotive** applications



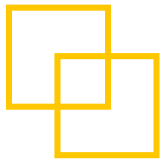
**Features** targeting specific automotive use cases innovation



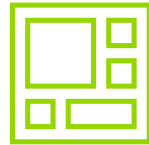
## Safety Ready

- Safety-grade IP blocks
- Certified software components
- Safety certification materials

- △ Reduces design effort
- △ Accelerates deployment
- △ Eases certification to ISO26262
- △ Broad range of Safety Ready IP from Arm

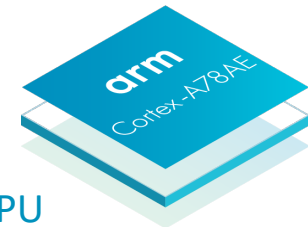


**Safety** innovations like Split-/Hybrid-Lock ease software development



Expanding to a wider range of automotive IP in the **future**

## 2020 AE IP Launch:



CPU



GPU



ISP



# Extensive Array of Safety Ready Products

✦ **Cortex-M**

- Cortex-M0+
- Cortex-M3
- Cortex-M4
- Cortex-M7
- Cortex-M23
- Cortex-M33

✦ **Cortex-R**

- Cortex-R5
- Cortex-R52
- Cortex-R52+

✦ **Cortex-A**

- Cortex-A32
- Cortex-A35
- Cortex-A53
- Cortex-A55
- Cortex-A65AE
- Cortex-A72
- Cortex-A76
- Cortex-A76AE
- Cortex-A78AE

✦ **ISP, GPU, Support**

- Mali-G78AE
- Mali-C71AE
- CMN-600AE
- GIC-600AE
- MMU-600AE
- Arm Compilers
- FuSa RTS
- Artisan Physical IP

Further supported by Software Test Libraries (STL)

## Many paths to Market with Arm, depending on your goals

- **Standard products / ASIC:**

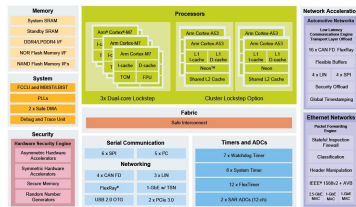
Wide range of suppliers providing Arm SoC's for automotive + many other MCU's



- **Custom silicon by OEMs:**

Growing trend toward custom parts for better integration, cost, power, differentiation

# Recent public Arm-based automotive SoCs



S32 gateway & body family:  
Cortex-A53, Cortex-R52



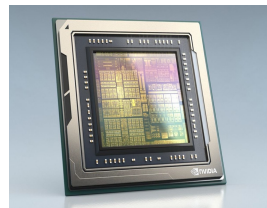
Stellar microcontroller family:  
Cortex R52



Exynos Auto V9 IVI SoC:  
Cortex-A76, Mali-G76



V3U ADAS SoC:  
Cortex-A76, Cortex-R52



Drive AGX Orin SoC:  
Cortex-A78AE



Dolphin5 ADAS/IVI SoC:  
Cortex-A76, Mali-G78AE, N78

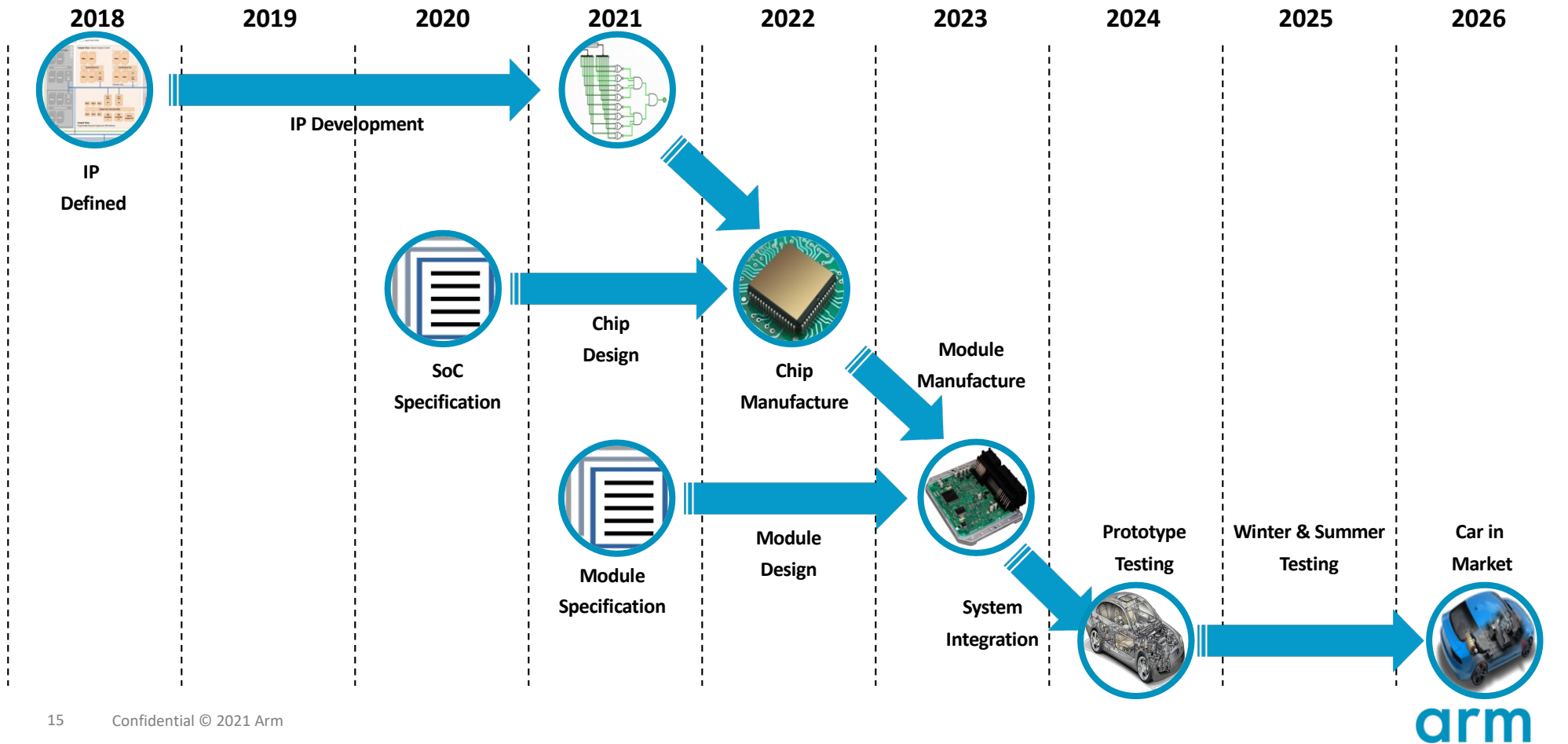
# Autonomous Vehicle Computing Consortium



AVC CONSORTIUM



# Typical automotive system development timeline



# Arm Functional Safety webinar series

Hosted by Arm Functional Safety Partnership Program

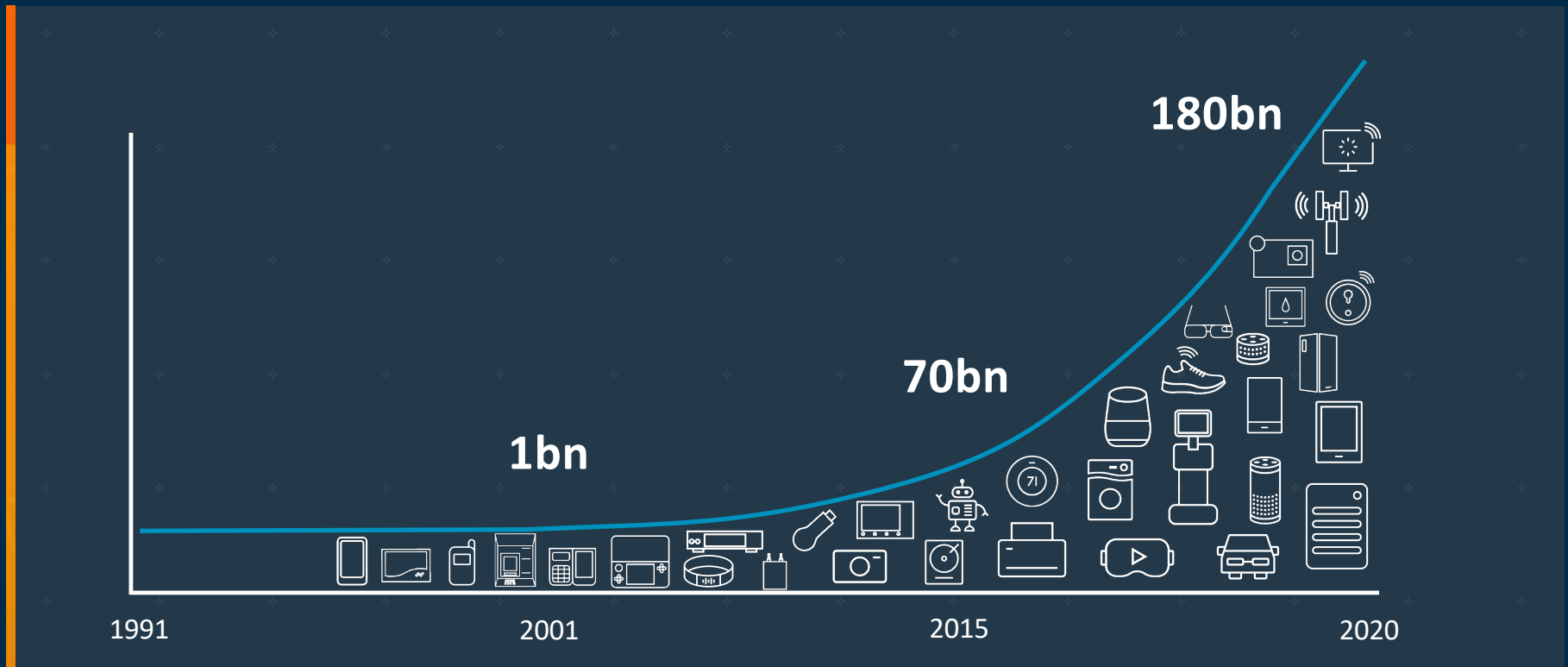


To register – Follow the links

- [Future-Proof Vision Systems for ADAS](https://tinyurl.com/FuSa-Series-1)
  - <https://tinyurl.com/FuSa-Series-1>
- [Functional Safety Development Solutions for Arm Cortex-M](https://tinyurl.com/FuSa-Series-2)
  - <https://tinyurl.com/FuSa-Series-2>
- [Achieving Safety-Critical Rendering with Mali-G78AE, CoreAVI and DiSTI](https://tinyurl.com/FuSa-Series-3)
  - <https://tinyurl.com/FuSa-Series-3>



# Arm is Everywhere Compute Happens



arm

Thank You

Danke

Gracias

谢谢

ありがとう

Asante

Merci

감사합니다

धन्यवाद

Kiitos

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