



# DAHLIA

Very High Performance Microprocessor for Space Applications

DEFENCE AND SPACE

Jean-Luc Poupat  
27<sup>th</sup> Sept 2017

**AIRBUS**



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## Introduction

Consortium

DAHLIA Key Features

ARM Technology

Development Plan

Conclusion

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# Context & Objectives

DAHLIA is an answer to the H2020 topic

*“COMPET-1-2016: Critical Space Technologies for European Strategic Non-Dependence”*

DAHLIA is an **ARM-based System on Chip** implemented in 28nm FDSOI technology designed to boost competitiveness of any future Space equipment.

DAHLIA brings to reality what was still a dream few years ago, addressing the new expectations and new mindset of Space industry.





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# Organization

7 partners from 4 countries involving the main actors of European Space industry

- § ST *France*, coordinator
- § Airbus D&S *Germany & France*
- § Thales Alenia Space *Italy & France*
- § ISD *Greece & NanoXplore France*



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**ThalesAlenia**  
Space  
A Thales / Finmeccanica Company

**ST**  
life.augmented

**ISD** S.A.  
Integrated Systems Development

**NX**  
NanoXplore

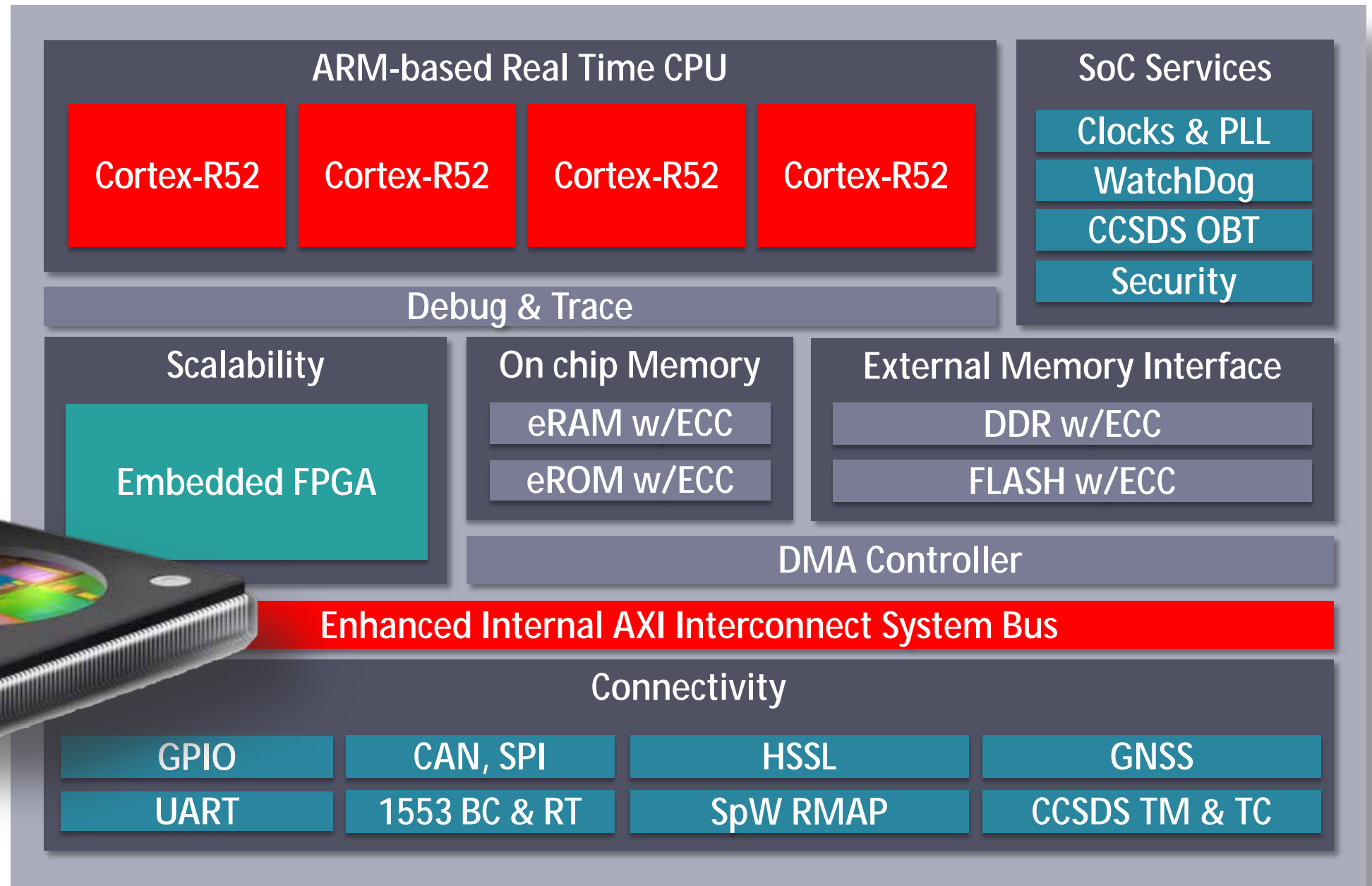


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# Features

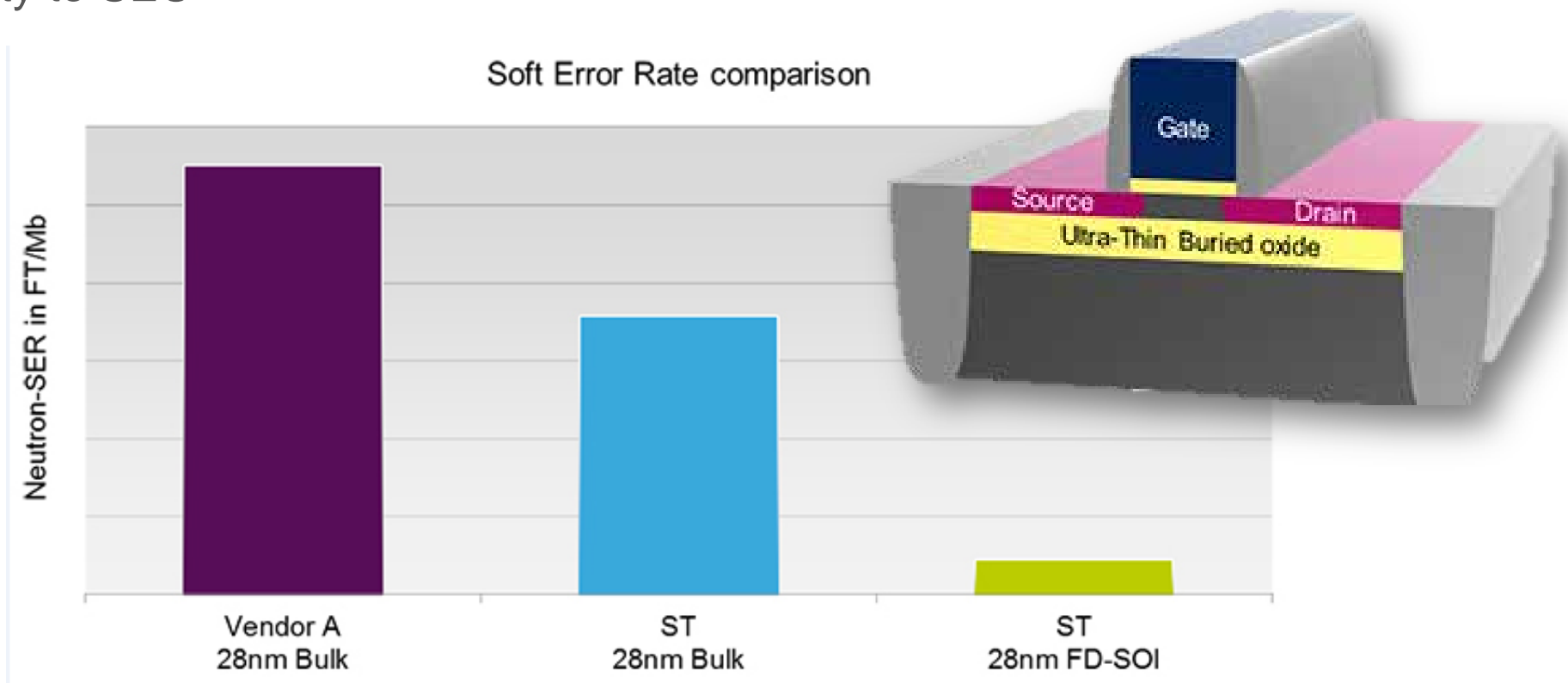


# STM 28nm FDSOI Technology

Intrinsically immune to Latch-up

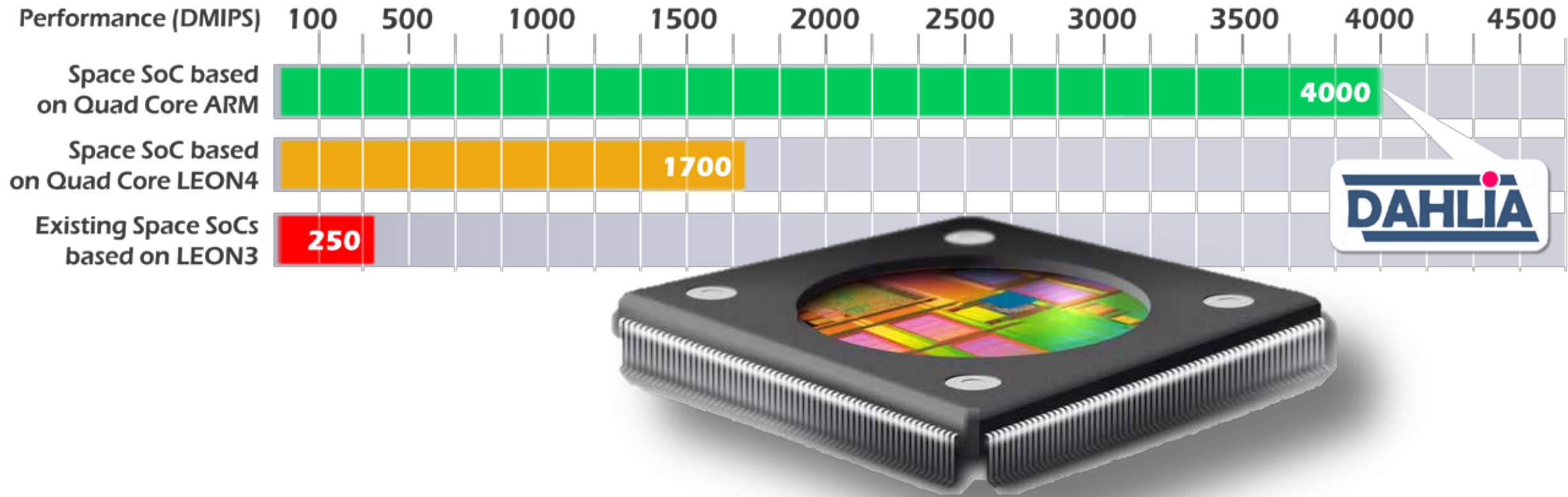
Reduced pitch size providing good dose tolerance

Very good immunity to SEU





# Designed for ultimate performances





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# Why looking at ARM ?

# 100 BILLIONS OF CHIPS



# Why looking at ARM ?

- ▮ Wide dissemination of ARM CPUs in embedded systems
- ▮ Available as an RTL IP Core with full access to source code
- ▮ ARM ecosystem
- ▮ Code density better than its competitors
- ▮ Many development languages
- ▮ European technology (UK & FR)
- ▮ Low power
- ▮ Now focused on safety critical applications

- à New SW development & environment
- à ARM market business plan
- à Radiation assessment

# ARM®



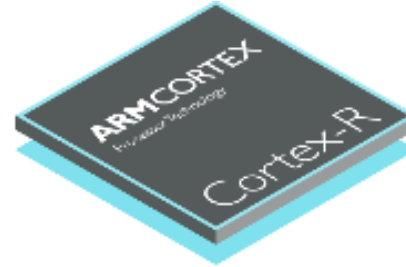


# ARM Technology Selection



## Cortex-A

Highest performance  
Optimized for rich  
operating systems



## Cortex-R

Fast response  
Optimized for high-  
performance, hard real-  
time applications

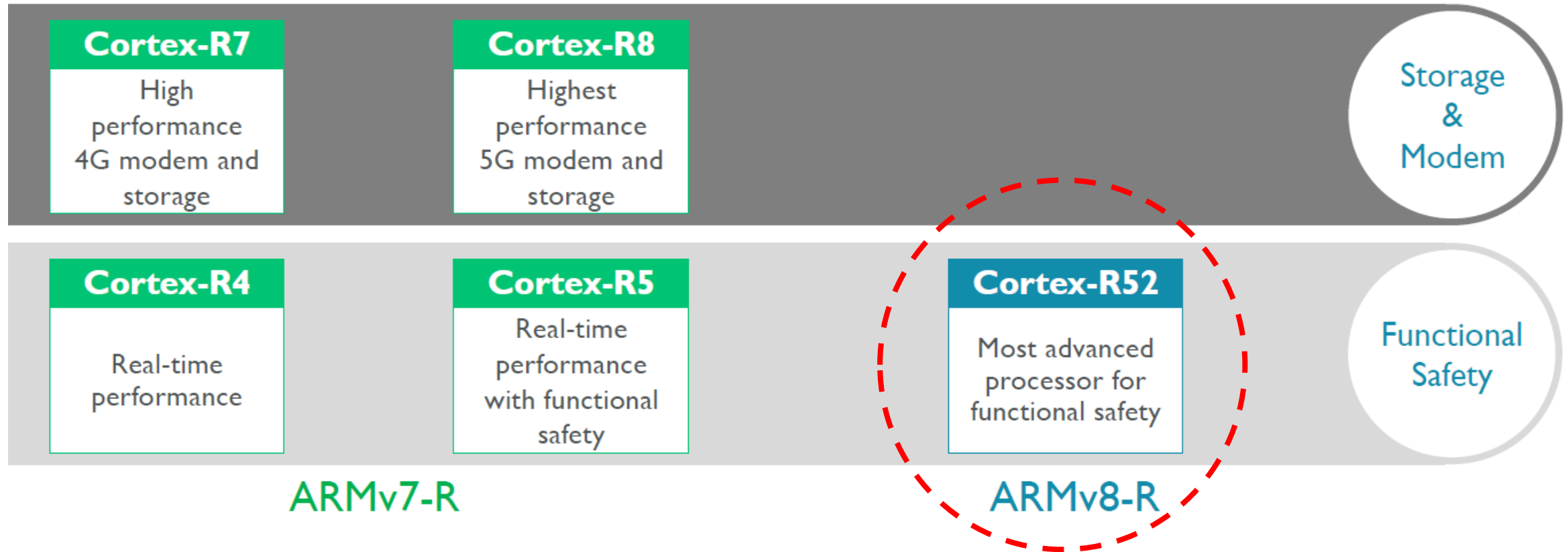


## Cortex-M

Smallest/lowest power  
Optimized for discrete  
processing and  
microcontroller



# ARM Technology Selection



# Cortex-R52

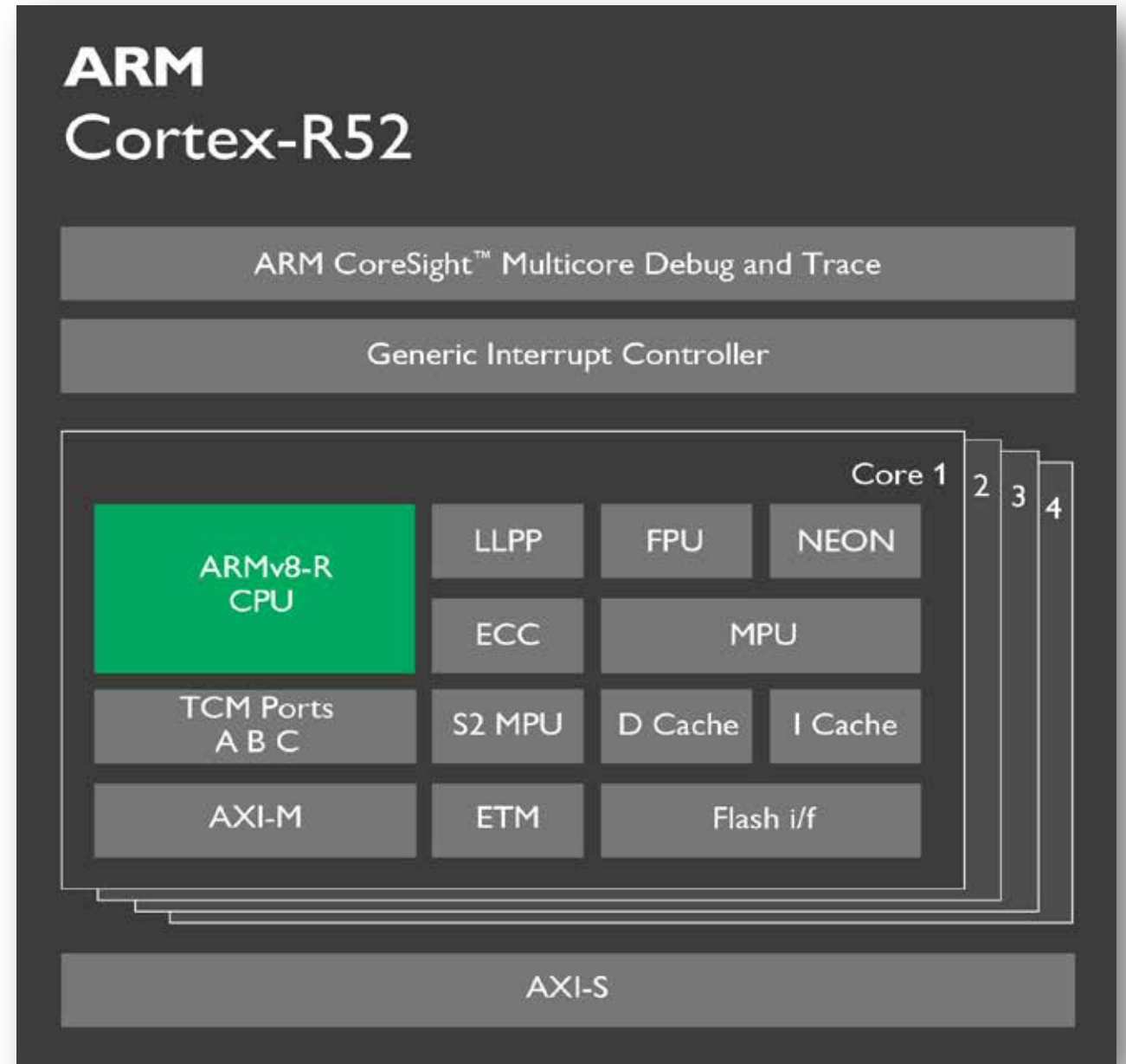
- ARM's most advanced processor for safety
- Dedicated for safety applications including automotive, industrial and healthcare
- Simplifies integration of software in complex safety systems



# Cortex-R52

Safety features dedicated to random errors

- ECC protected memory
- Software BIST libraries
- Error management
- Level 2 MPU
- New privilege level
- ...



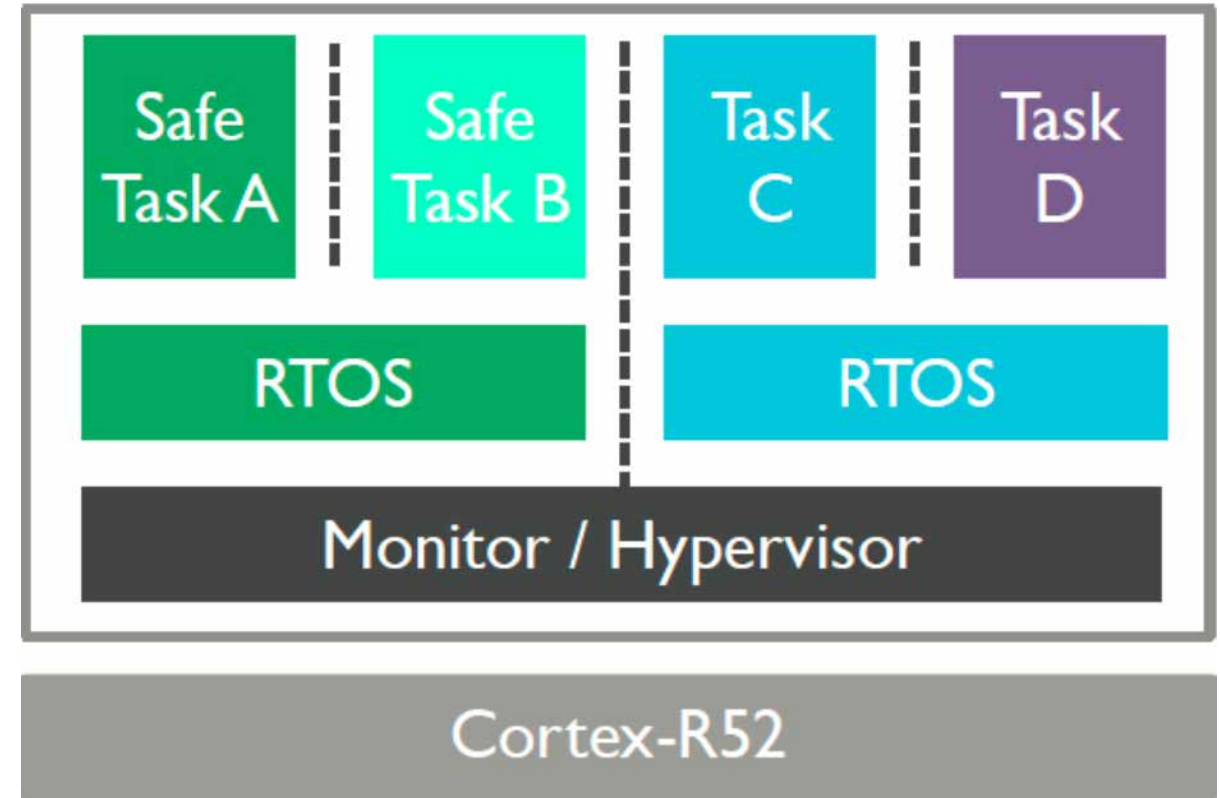


# Cortex-R52 simplifies real-time SW isolation



- ARMv8-R introduces new privilege level
- Create 'sandboxes' protected from other SW
- Monitor or Hypervisor manages software separation and simplifies isolation of tasks
- Real time switch rapidly between tasks and 'sandboxes'
- Simplified integration of complex SW from multiple sources

à Optimized for TSP





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# Development Plan

- § Kick-Off in 2017
- § Development in 2017-2018-2019
- § SoC FPGA prototyping in 2018
- § DAHLIA product available end 2019





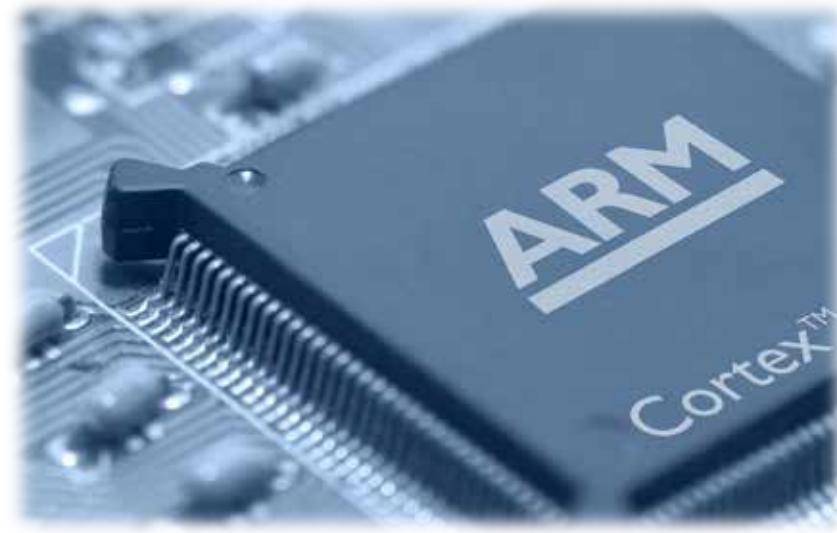
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# DAHLIA Keypoints



Powerful combination of innovative technology adapted for Space

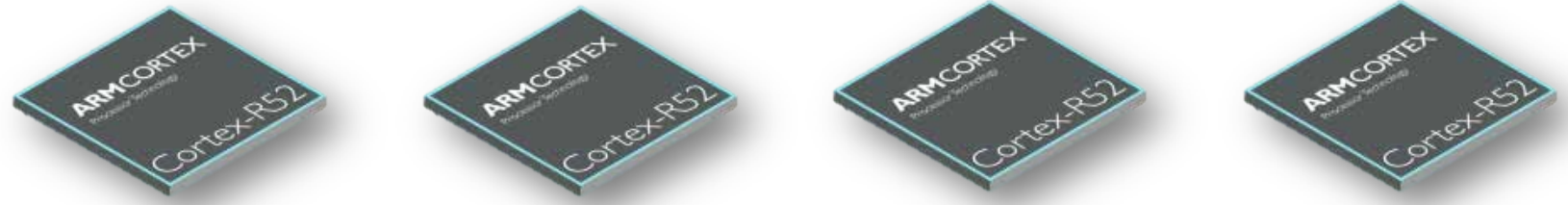


Optimized to support time and space partitioning for centralized avionics



Designed to face the new challenges of Space such as mega-constellations

# Conclusion



The DAHLIA H2020 project covers the development of a rad-hard high performance quad-core ARM R52 SoC in 28nm FDSOI technology, with eFPGA for flexibility and key IPs.

It will enable faster and cost-efficient development of products for multiple space applications.

Beyond Space applications, DAHLIA will enable the convergence with terrestrial applications benefiting from the strong ARM ecosystem.

DAHLIA brings to reality what was still a dream few years ago, addressing the new expectations and new mindset of Space industry.

[dahlia-h2020.eu](http://dahlia-h2020.eu)

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More details on DAHLIA are available the project website

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Thank you