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The CHERI Alliance

Getting security embedded into electronic systems

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lowRISC – Founding Member of the CHERI Alliance



lowRISC

Open:UK

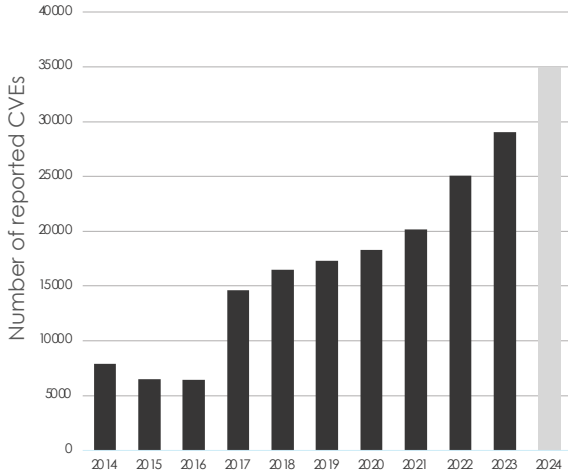
STATE OF OPEN CON'25

○ Agenda

- ◆ The memory safety problem
- ◆ CHERI technology
- ◆ The CHERI Alliance

The memory safety problem

Software vulnerabilities are causing increasing risk

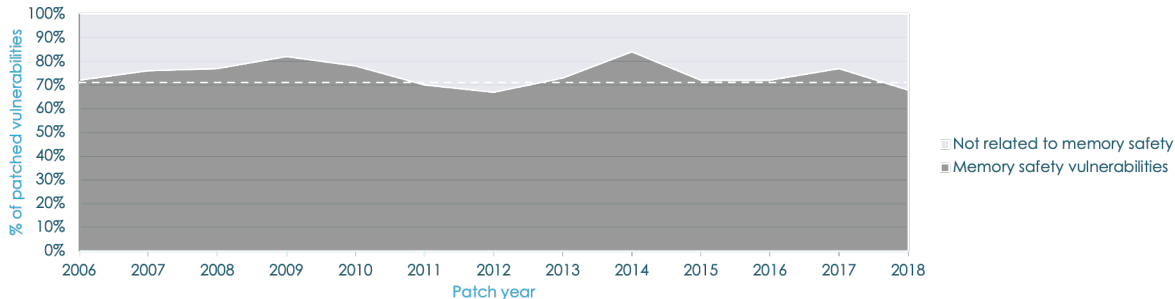


Source: Mitre



○ The main problem is (the lack of) memory safety

- ◆ Memory abuse (e.g. buffer overflows) is the main attack vector
- ◆ Constant ratio of over the past 20 years



○ Possible solutions for memory safety

- ✗ Use “memory safe” languages like Rust or .Net
 - Requires rewriting trillions of lines of C/C++ code
 - Possible for new code, but no compartmentalisation
- ✗ Use “coarse-grained” techniques like stack “canaries”
 - Helpful, but they statistically leave too many holes
 - Hacking techniques already developed
- ✓ Use “fine-grained” techniques like CHERI
 - Best option, but needs new hardware

CHERI technology

Capability
Hardware
Enhanced
RISC
Instructions

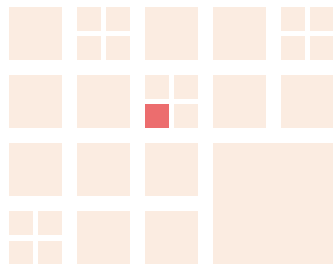
CHERI

Benefits

- Deterministic, fine-grained **memory protection**
- Scalable **compartmentalization**

An architectural solution

- Works with existing software
- Protects software with hardware
- Extension of conventional hardware ISAs



Compartmentalization
prevents contagion

○ CHERI and the UK



- Initiated by a project from



- Originally developed by



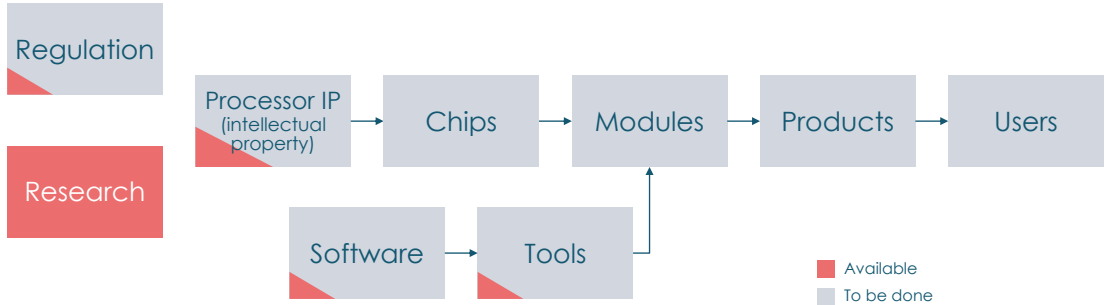
- Matured for 14 years
- Supported by



Getting CHERI adopted

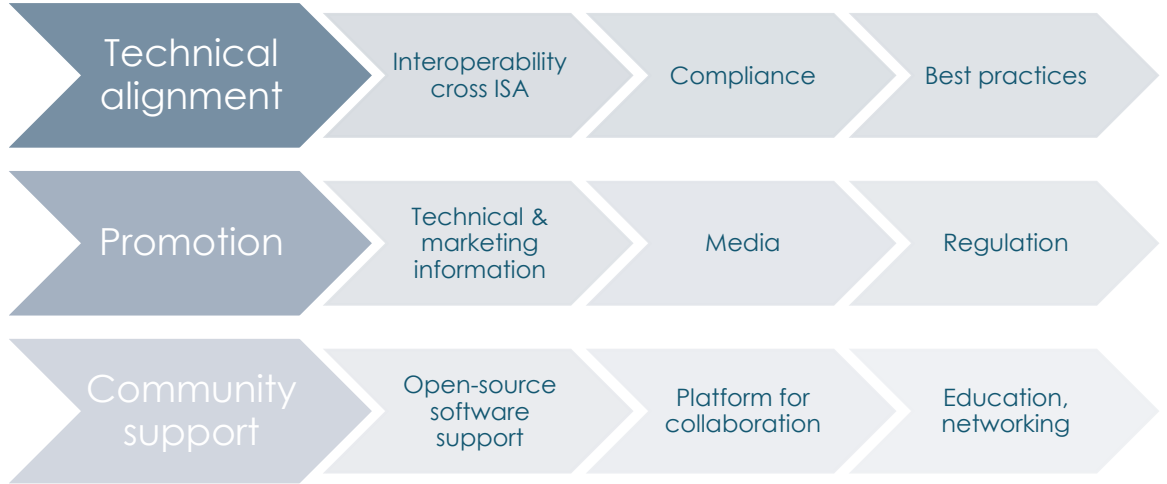
How to stimulate the industry?

Show benefits
Make it easy to adopt
Highlight risks (lack of security / upcoming regulations)



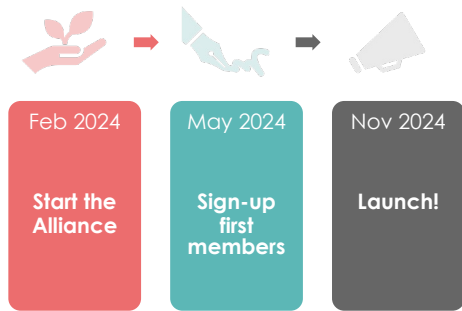
The CHERI Alliance

Role of the CHERI Alliance



○ An independent entity

- ISA-agnostic
 - CHERI could be added to Arm, x86, MIPS, RISC-V, ...
- Worldwide reach
- Not just one company
 - Need broad industry adoption
 - Need a community
- Financed by the industry*



* with financial support from



Department for
Science, Innovation,
& Technology

Founding members of the CHERI Alliance



○ **CHERI and the UK**

- Largely developed by University of Cambridge
 - Involvement of many other UK universities
- Strong local expertise
 - E.g. CHERI design teams located in Bristol, Cambridge, ...
- Support by



○ Benefits for members



Demonstrate
security
leadership



Network,
collaborate
and exchange



Accelerate
adoption of
CHERI



Share
promotion
costs



Activate the
community

Join us!



CHERI

THANK YOU

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