CHERITech'26
CONFERENCE

12-13 Nov 2026
Munich, DE

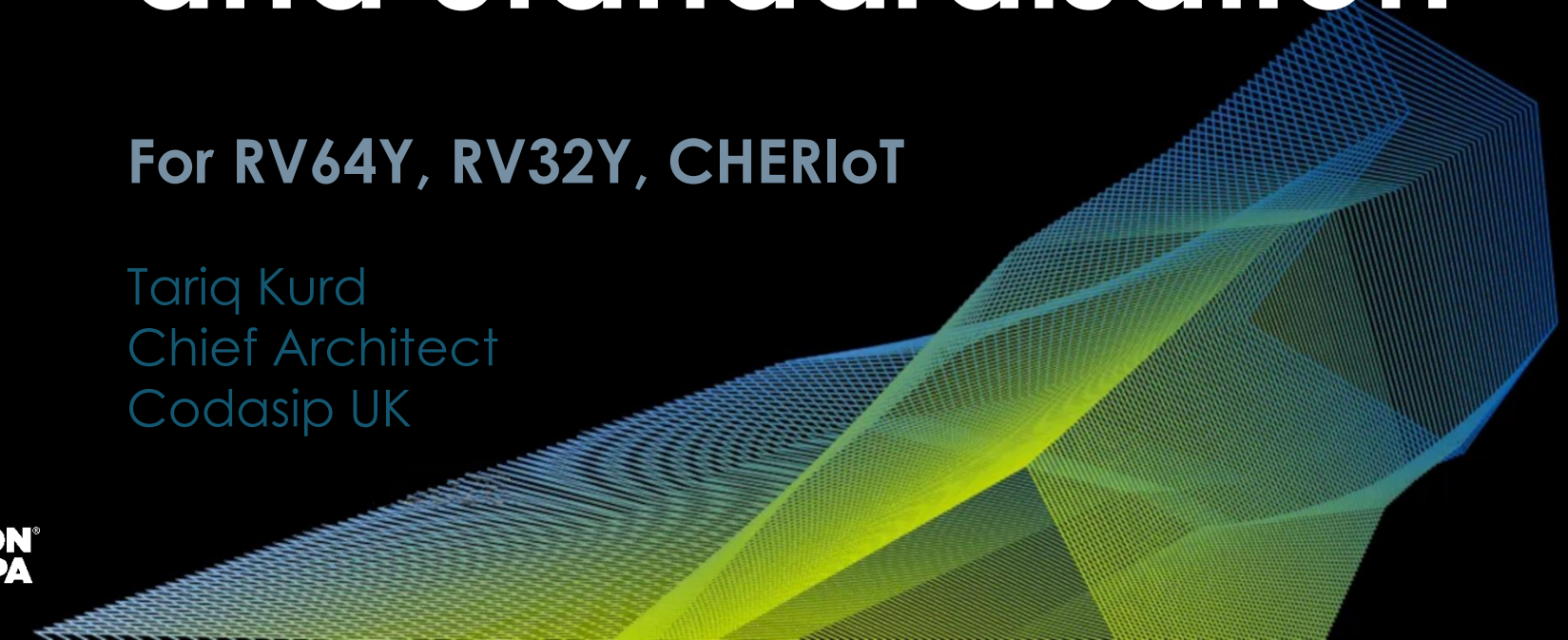
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CHERI

# CHERI Specification and Standardisation

## For RV64Y, RV32Y, CHERIoT

Tariq Kurd
Chief Architect
Codasip UK



# Agenda

- RV64Y Application Cores and Profiles equivalent to RVA23/ RVB23
- Embedded Cores including RV32Y
- CHERIoT Cores

# RISC-V Ratification Flow



# RISC-V Ratification Flow

- Inception
  - The spark that gets things going
- Plan
  - Get a plan approved
- Develop
  - Create and refine the specification
- **Freeze**
  - **Pass architecture review**
- Public Review & Ratification Ready
  - ~40 days
- Ratified
  - Approved by the Board Of Directors

See https://riscv.org/specifications/development/

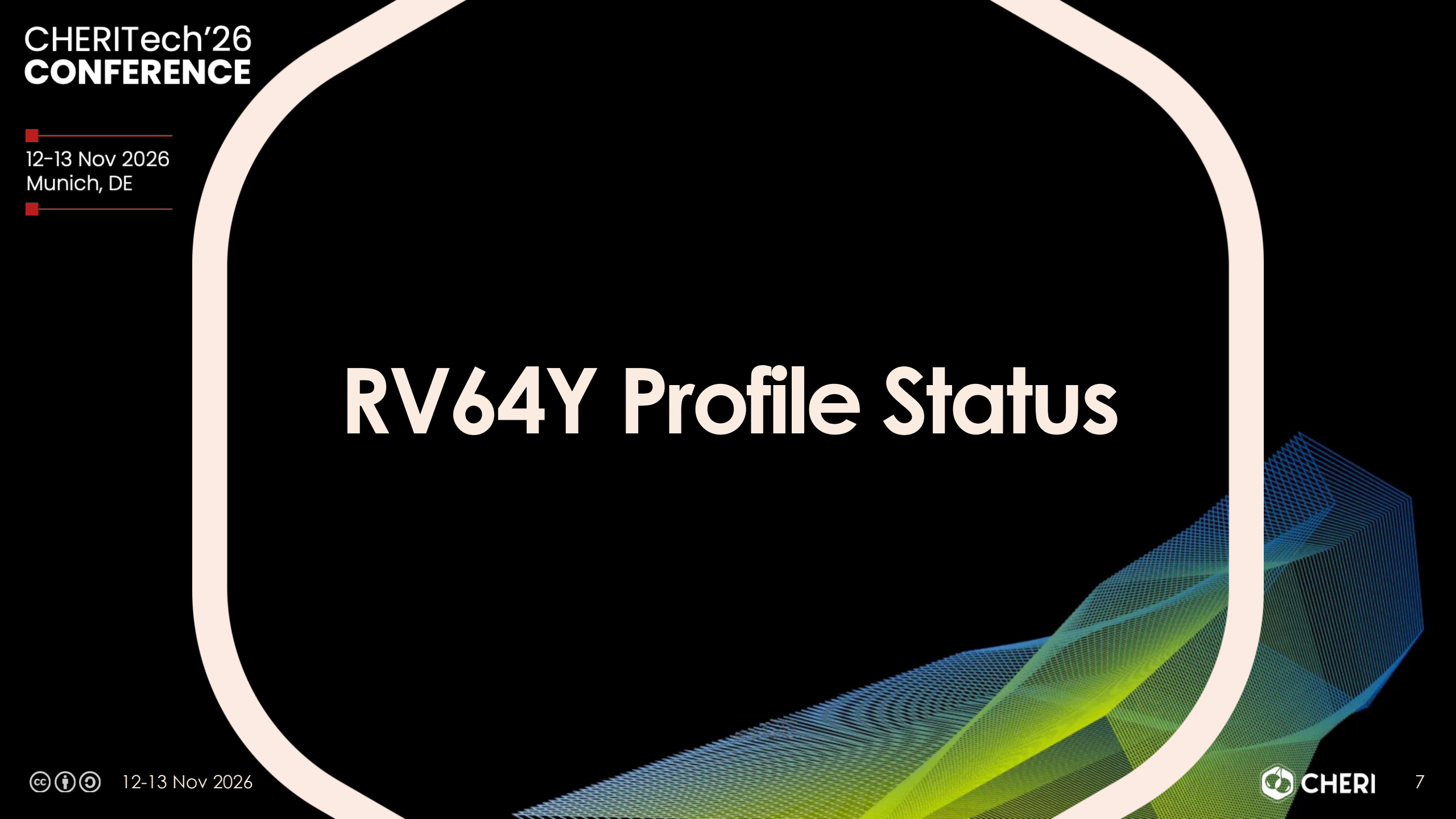
# RV64Y Application Core Status



# RV64Y Application Core Specification Status

- The specification for RV64Y Application Cores is in Final Architecture Review, completion expected end 2026.
  - Then we can hit the FREEZE milestone.
  - This allows the tools to be upstreamed and for companies to use the specification without fear of instability.
- The specification covers
  - RV64Y Base ISA for Application Cores
  - Extensions include:
    - Svyrg: Optimised memory sweeping for Revocation
    - Zylg: Limit capability propagation e.g. no sharing between stack and heap
    - Zyhybrid: Run standard RISC-V binaries on a CHERI core

# RV64Y Profile Status



# RISC-V has RVA23 and RVB23 Profiles

- RVA23 is the Linux platform profile
  - ***Ubuntu:*** *Raised its RISC-V baseline to RVA23 with Ubuntu 25.10 and* ***Ubuntu 26.04 LTS*** *(released April 2026)*
  - *Other distros are on their way there*
- RVB23 is the Rich-OS profile and is usable by Yocto-based custom Linux distributions
  - CHERI will support this first, moving to the RVA23 equivalent in 2027

# Why Support RVB23 First?

- The difference between RVA23 and RVB23 is primarily three extensions which are *optional* in RVB23 but *mandatory* in RVA23:
  - Hypervisor
  - Vector
  - Pointer Masking
- All are available for CHERI but….
  - Hypervisor prototyping is incomplete
  - Pointer Masking prototyping is still to be done
  - Vector is already included, as it is orthogonal to CHERI
- Therefore, only Vector is in final review at the time of writing

# RV64Y 2027 Objectives



# 2027 Targets



- Ratified RV64Y standard



- Ratified RVB23 Profile for CHERI



- Ratified Hypervisor, Pointer Masking and RVA23 Profile for CHERI

# What about Embedded Cores

# Embedded and 32-bit CHERI cores

- Embedded 64-bit cores will use a subset of the soon-to-be-ratified standard.
  - There are enough extensions specified to allow these to be built.
- Embedded 32-bit cores need a compact capability encoding format
  - RV32Y based upon the same capability-encoding format as RV64Y will be submitted in 2027 with the objective of being ratified the same year.
    - It can submitted as a fast track as a simple increment.

# What about CHERIoT Cores

# CHERIoT Cores

- CHERIoT Cores have very specific specialisations for micro-controllers.
  - For example
    - more permissions
    - more sophisticated mechanisms
    - built-in use-after-free protection for small memory maps
    - no support for standard RISC-V binaries
- The differences from RV64Y to CHERIoT are larger than from RV64Y to RV32Y
  - We expect to form a new TG in 2027
  - As soon as RV64Y is frozen we can request to form the new TG, with the objective of having a ratified specification in 2027

# CHERI 2027 Objectives



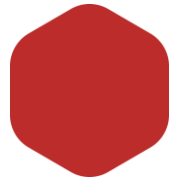
# 2027 Targets



- Ratified RV64Y standard
- Ratified RV32Y standard
- Ratified CHERIoT standard

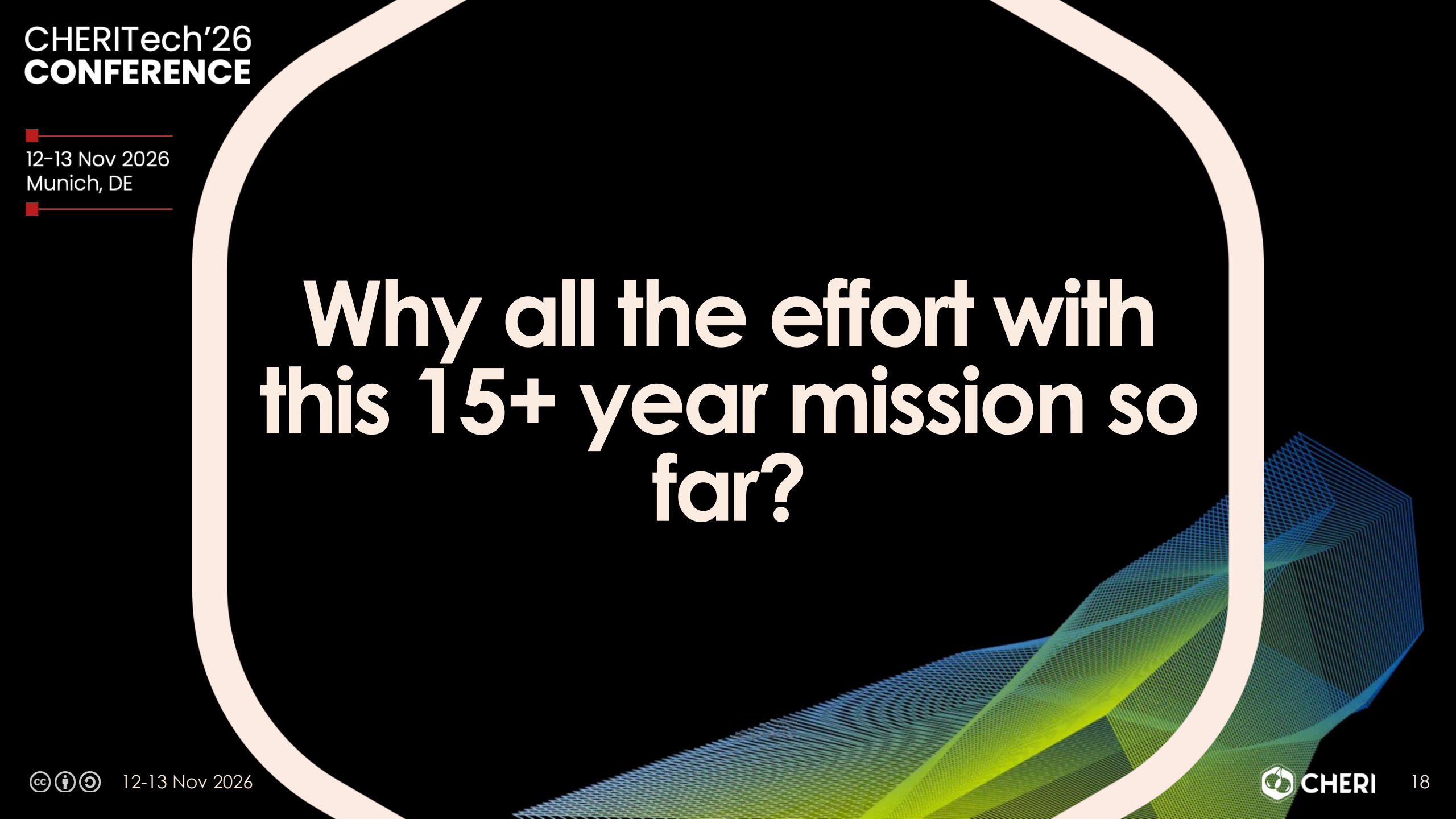


- Ratified RVA23 profile for CHERI
- Ratified RVB23 profile for CHERI



- Ratified additional extensions:
  - At least Hypervisor, Pointer Masking
  - Optimised application core revocation

# Why all the effort with this 15+ year mission so far?



# The Cyber Security Crisis is real and getting worse

- 70% of the world's websites are down due to critical bugs in PHP
  - True at the time of writing the presentation (22nd October 2026)
- This has been caused by two memory corruption vulnerabilities allowing remote code execution which are both avoided by running on CHERI processors
  - CVE-2026-109618
  - CVE-2026-109619
- Globally we need to wake up and start deploying CHERI



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CHERI

# THANK YOU

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