System-on-Module survey report

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On behalf of SoC Interest Group

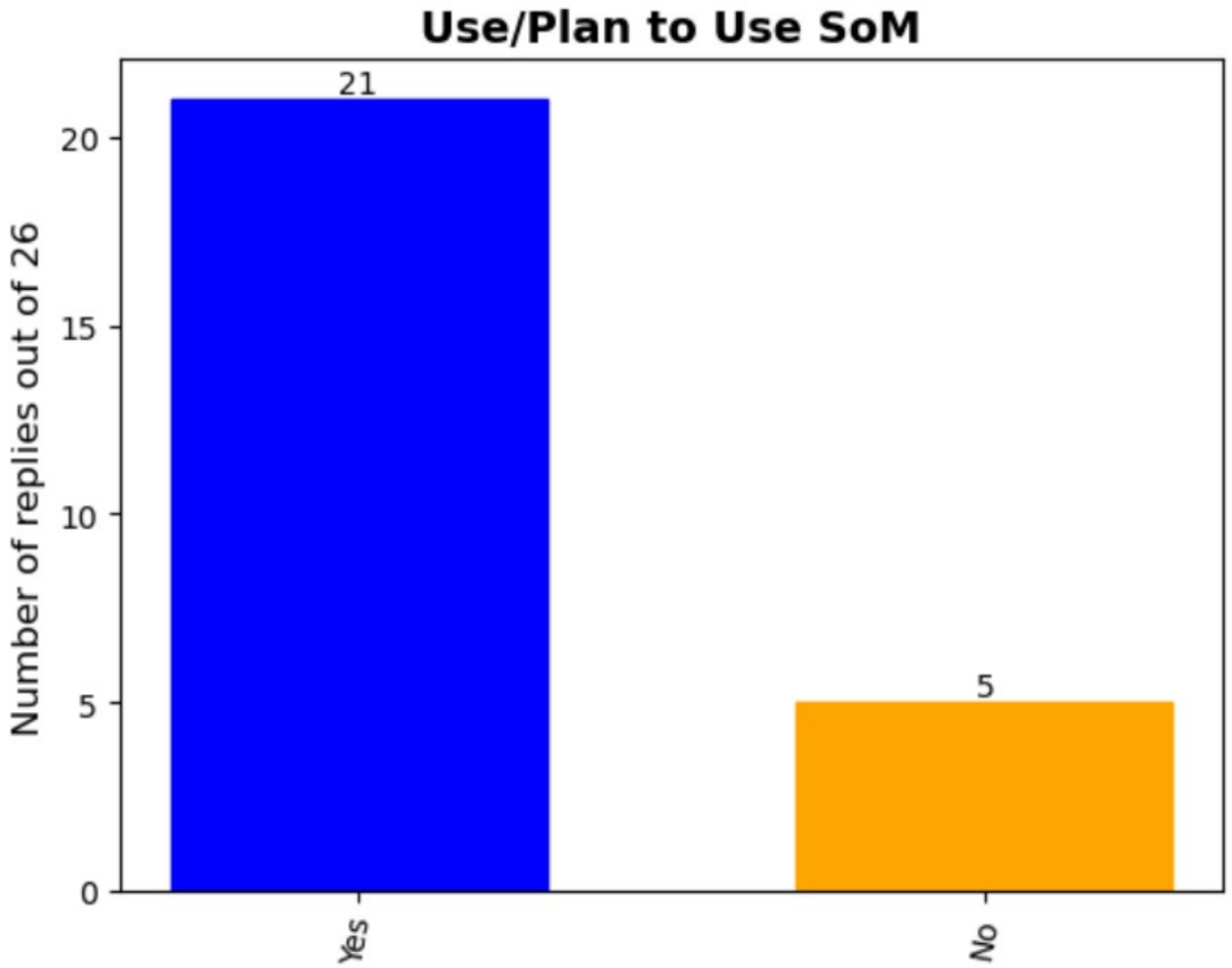
https://twiki.cern.ch/twiki/bin/view/SystemOnChip/WebHome

24 May 2023

SoM Survey - reminder

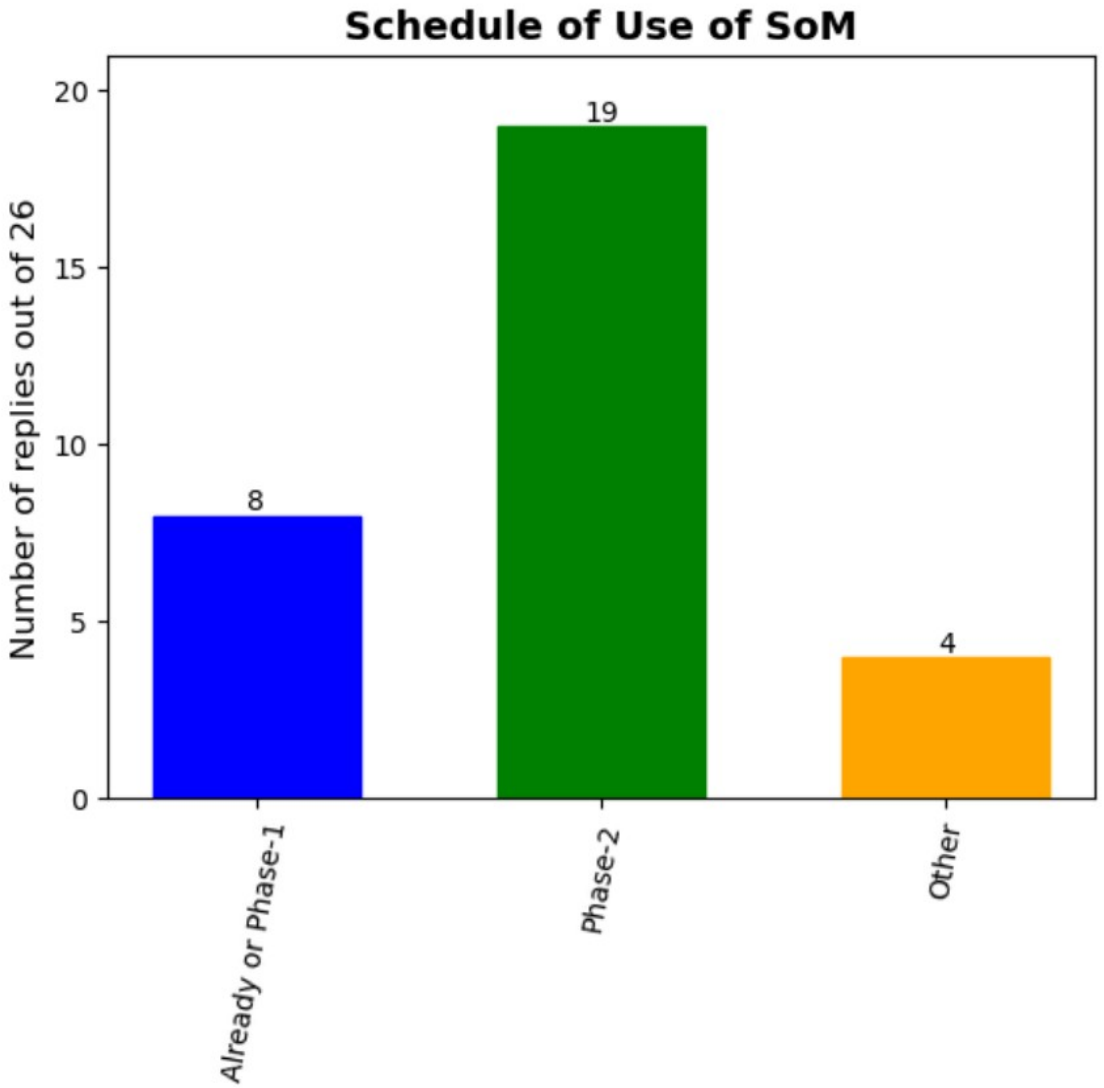
- Taken during April and May 2022 among the members of the SoC Interest Group
- Multitude of questions: do you use/plan to use SoM, what type, number of modules, applications, requirements, challenges, wishlist
- 26 responses from the whole CERN
- After careful analysis, survey report is now ready!
- The full report CERN-OPEN-2023-001 can be found here: http://cds.cern.ch/record/2847967

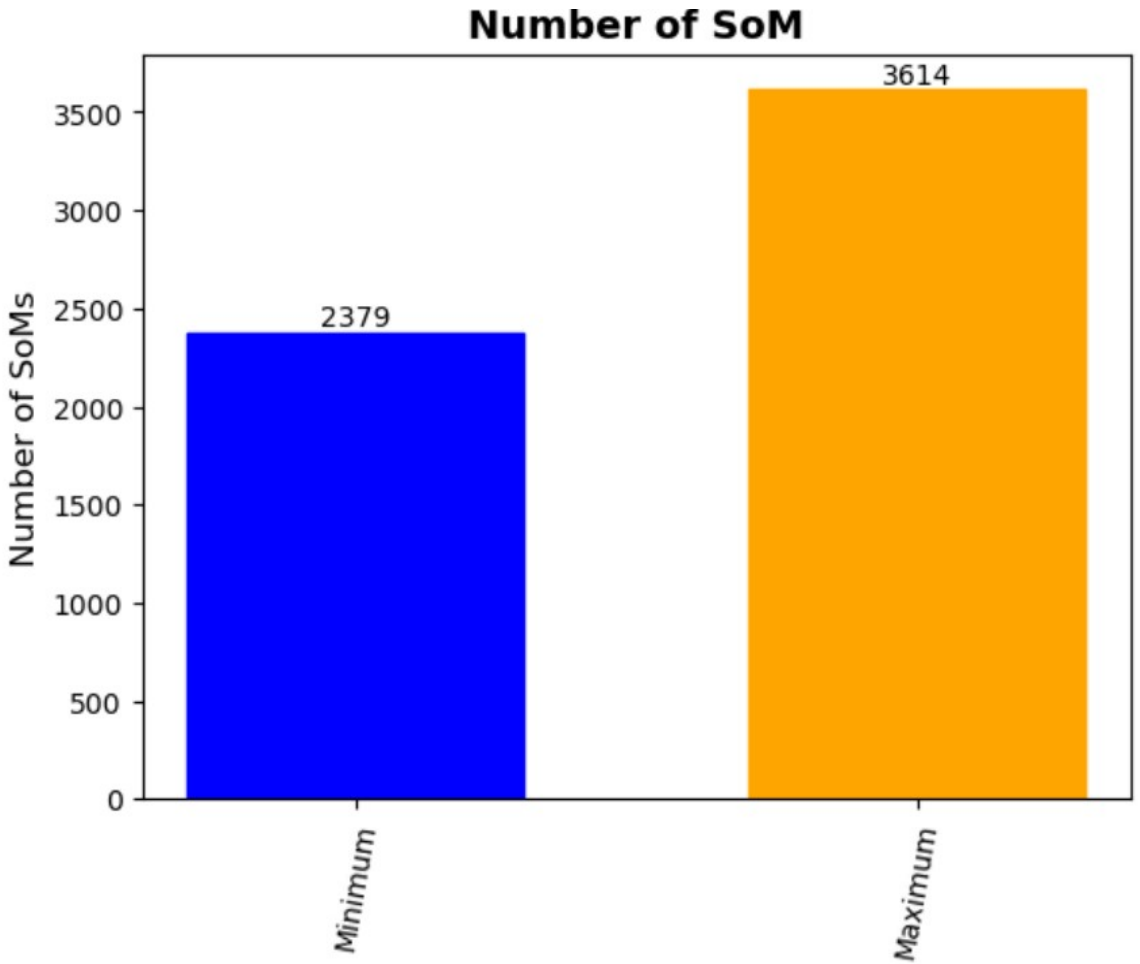
Do you use/plan to use SoM?



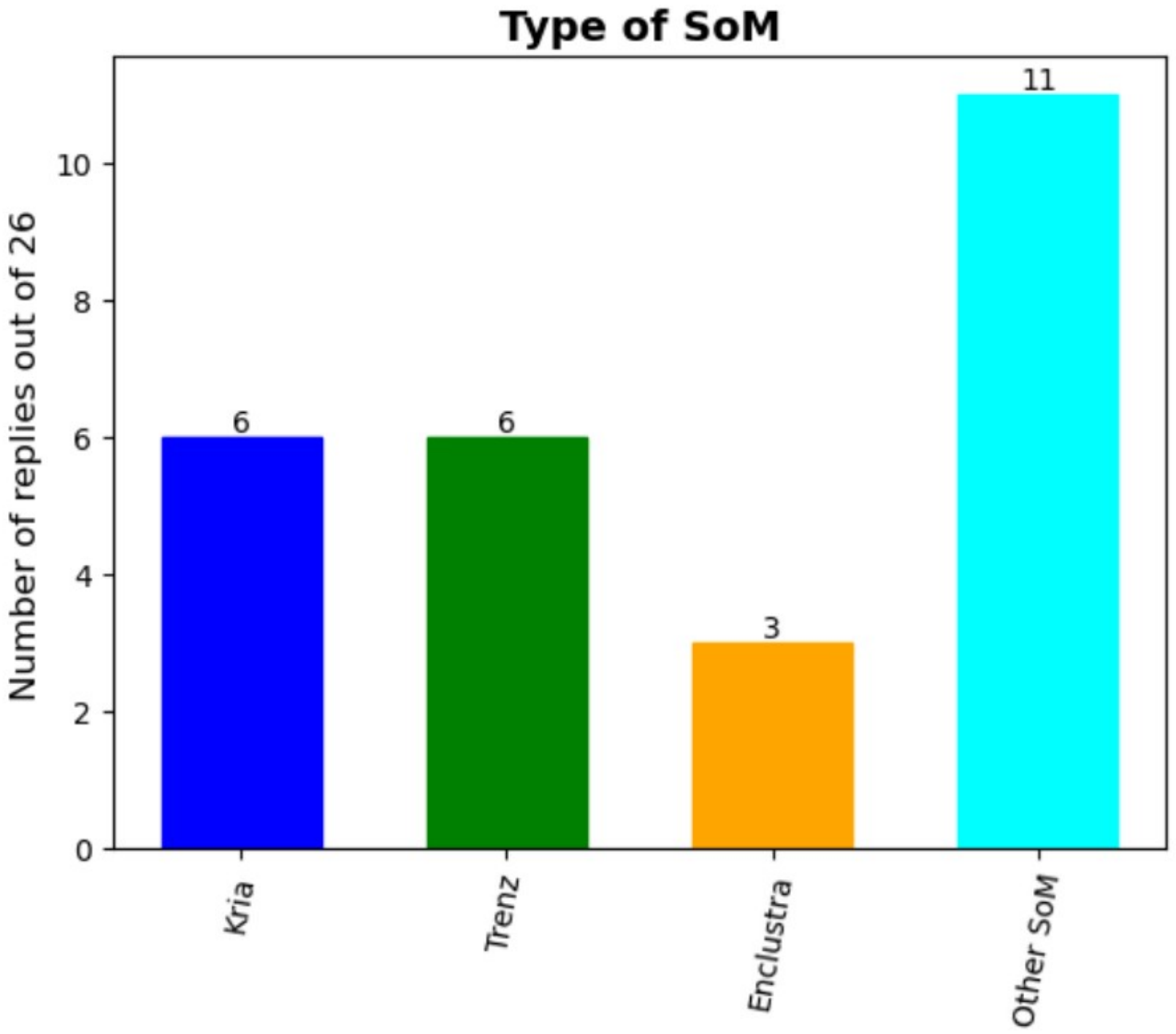
- Presented here are general conclusions
- More detailed analysis available in the report

When and how many modules?





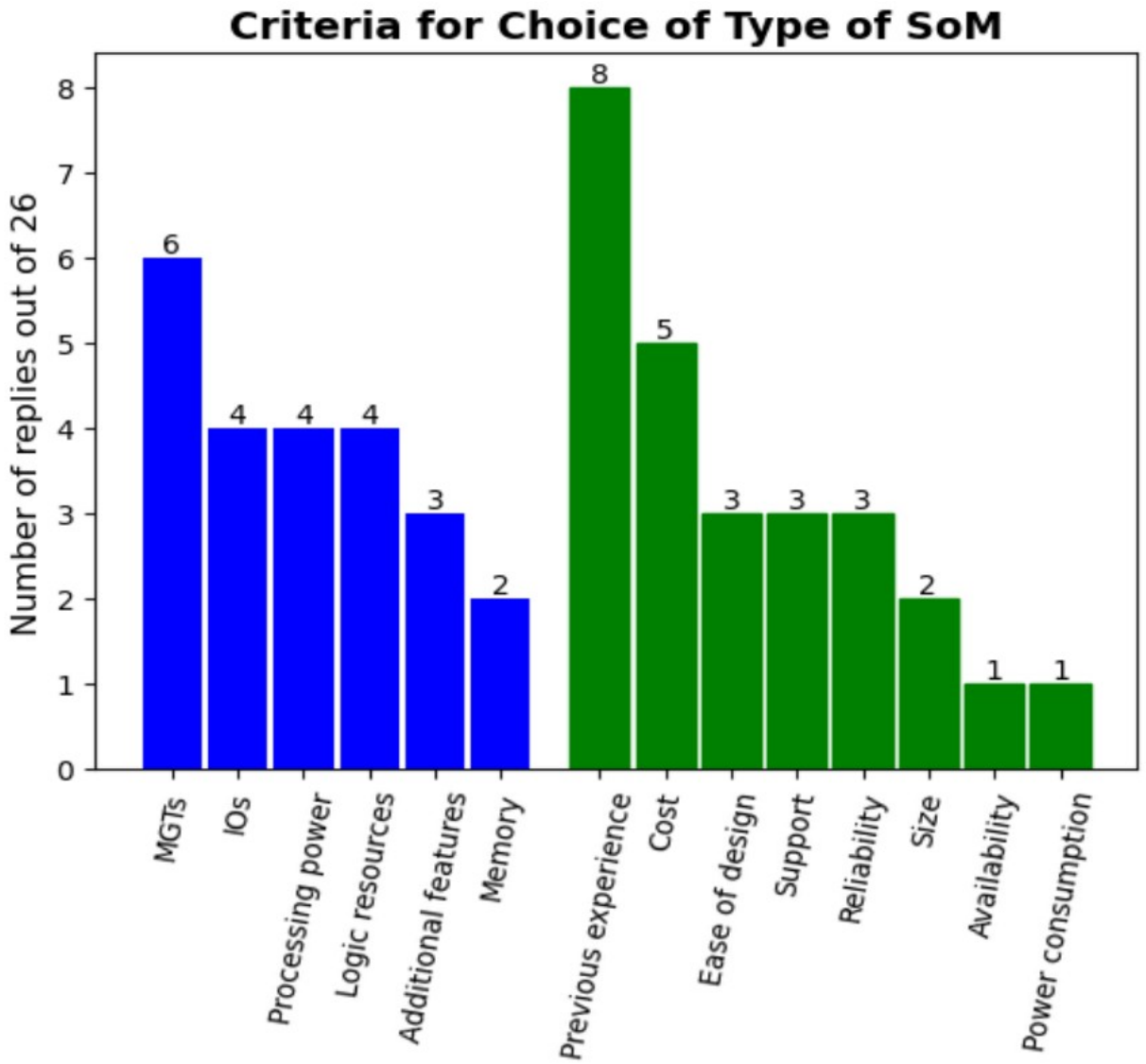
SoM vendors



Other vendors:

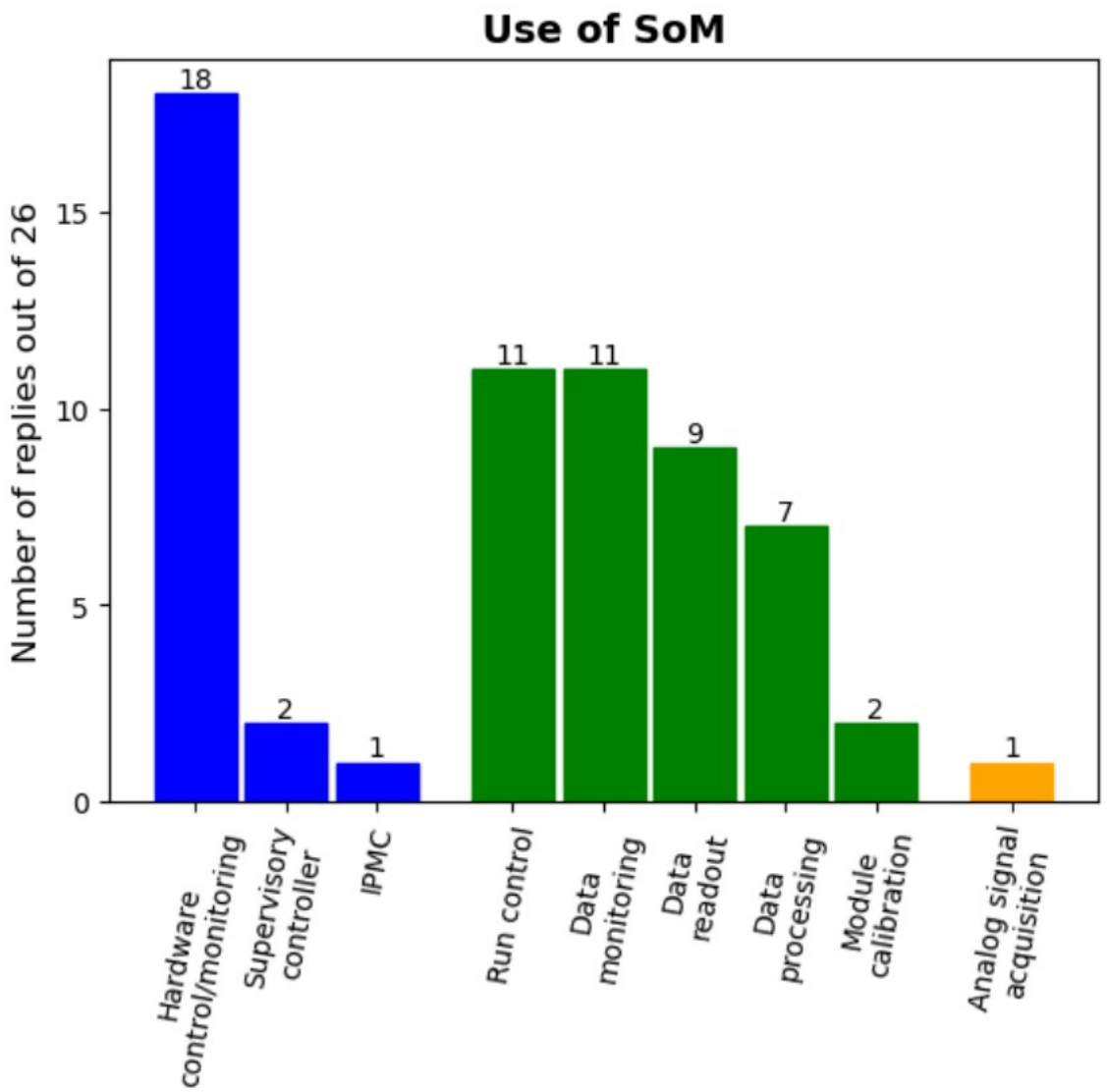
- Ultrazed-EV from AVNET
- Aldec
- Iwave Systems
- MyIR Tech Systems
- Miami Zynq from TOPIC Embedded Systems
- University of Wisconsin-Madison

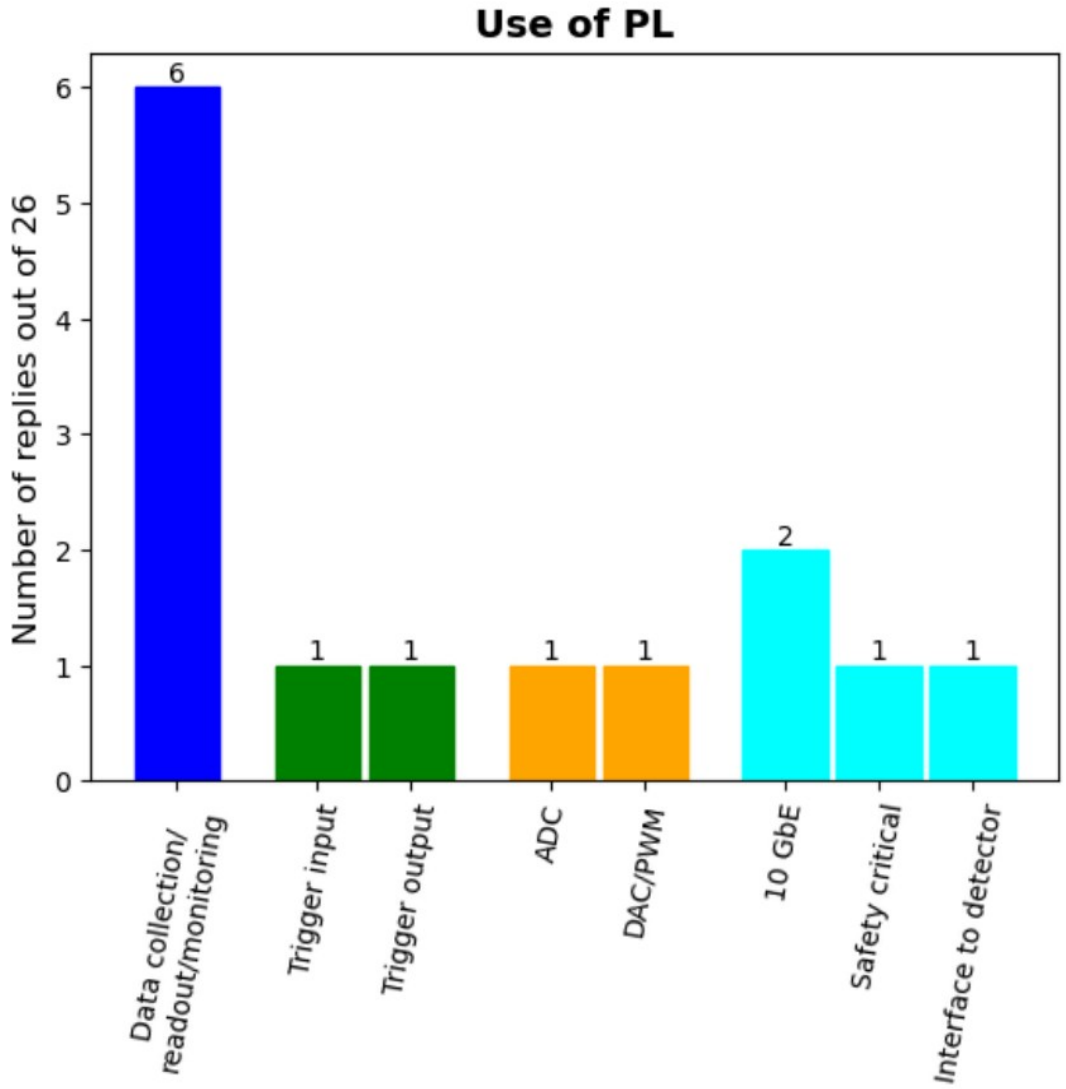
SoM vendors



- Technical and non-technical reasons
- IO/MGT interfaces dominate technical criteria
- Previous experience and cost are very important factors
- Availability is not an issue

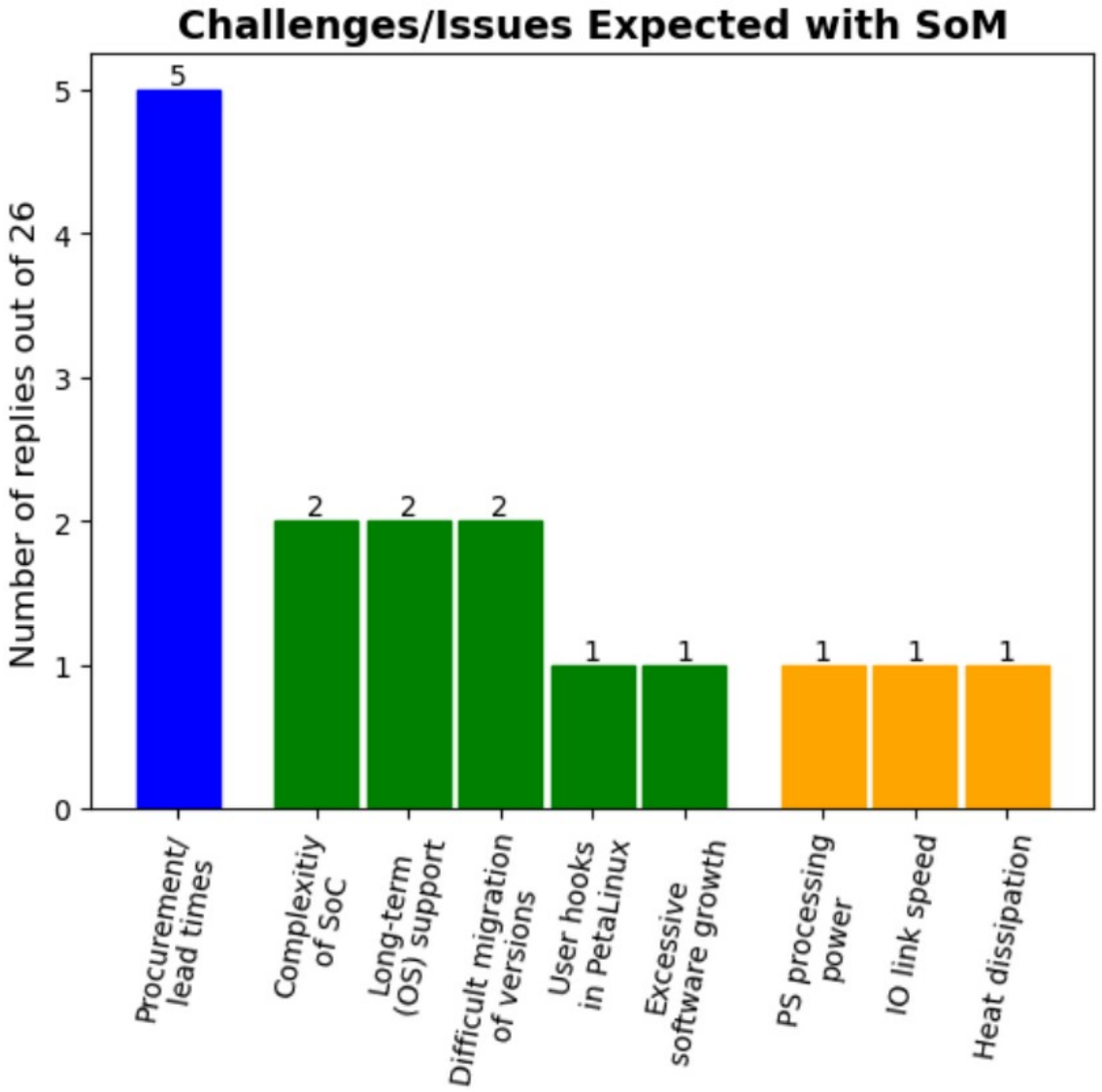
Applications



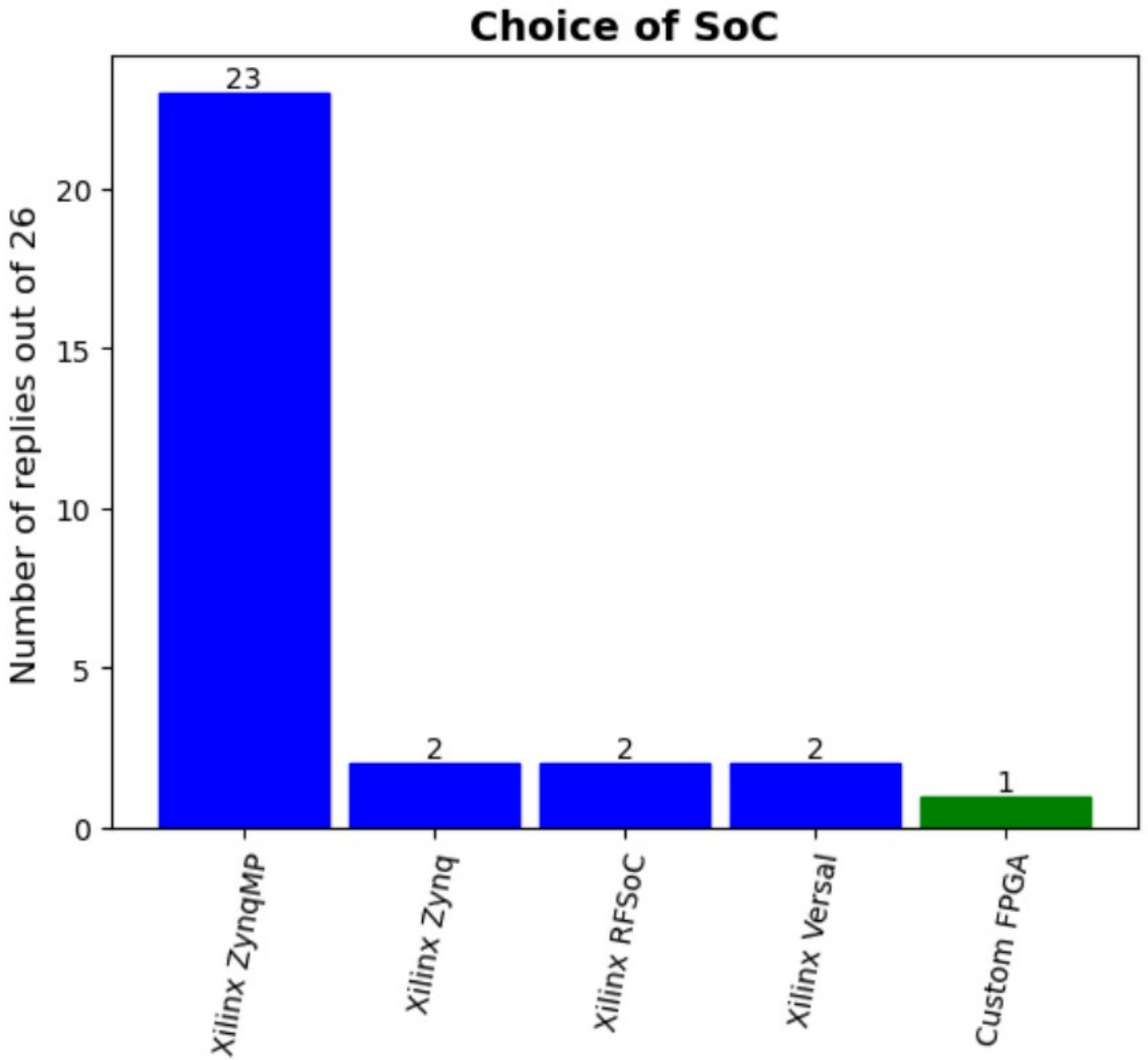


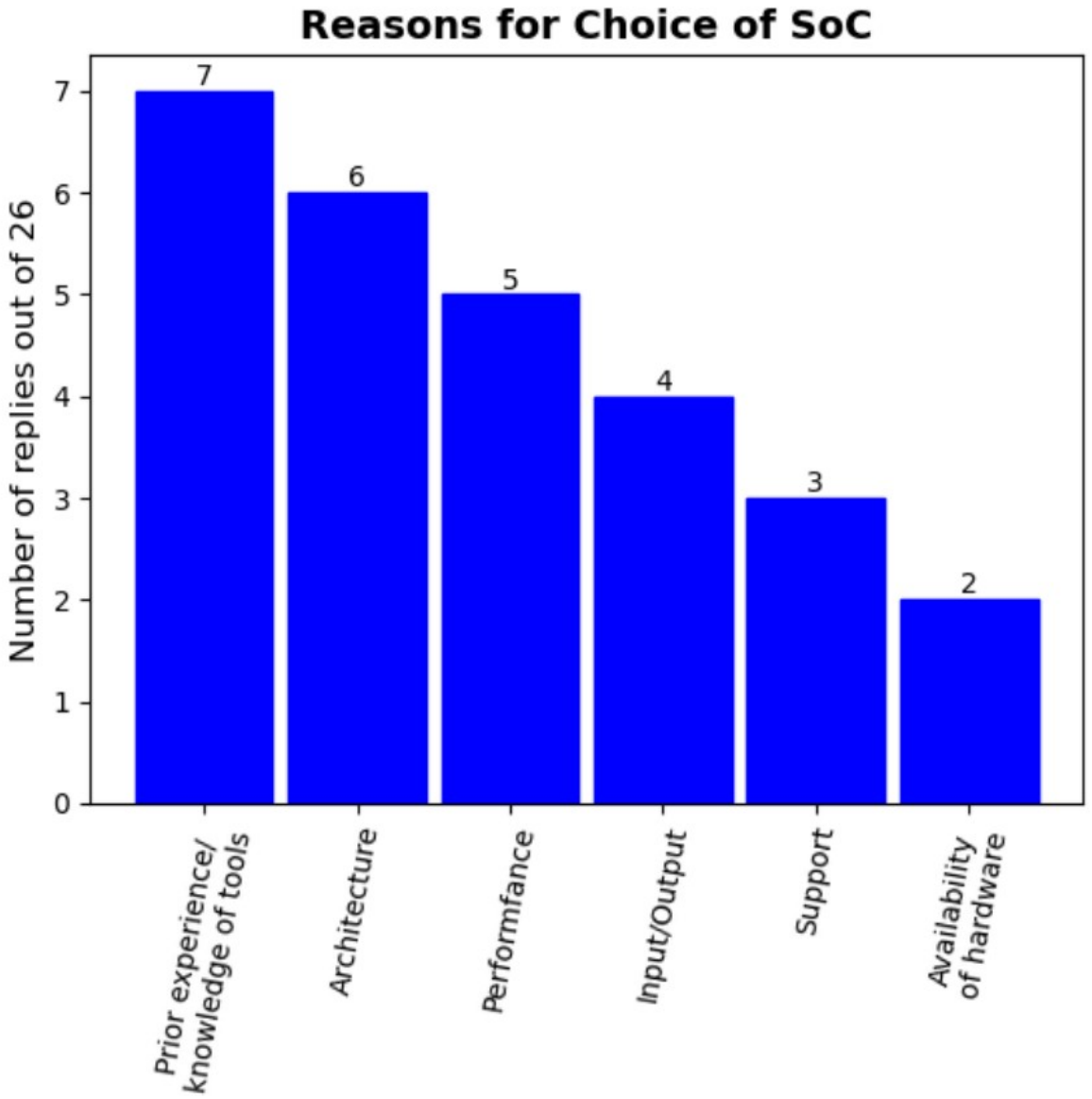
Challenges

- Procurement was still a major obstacle in 2022
- Size and complexity of software stack is dominating over hardware
- 11 replies didn’t mention any issues

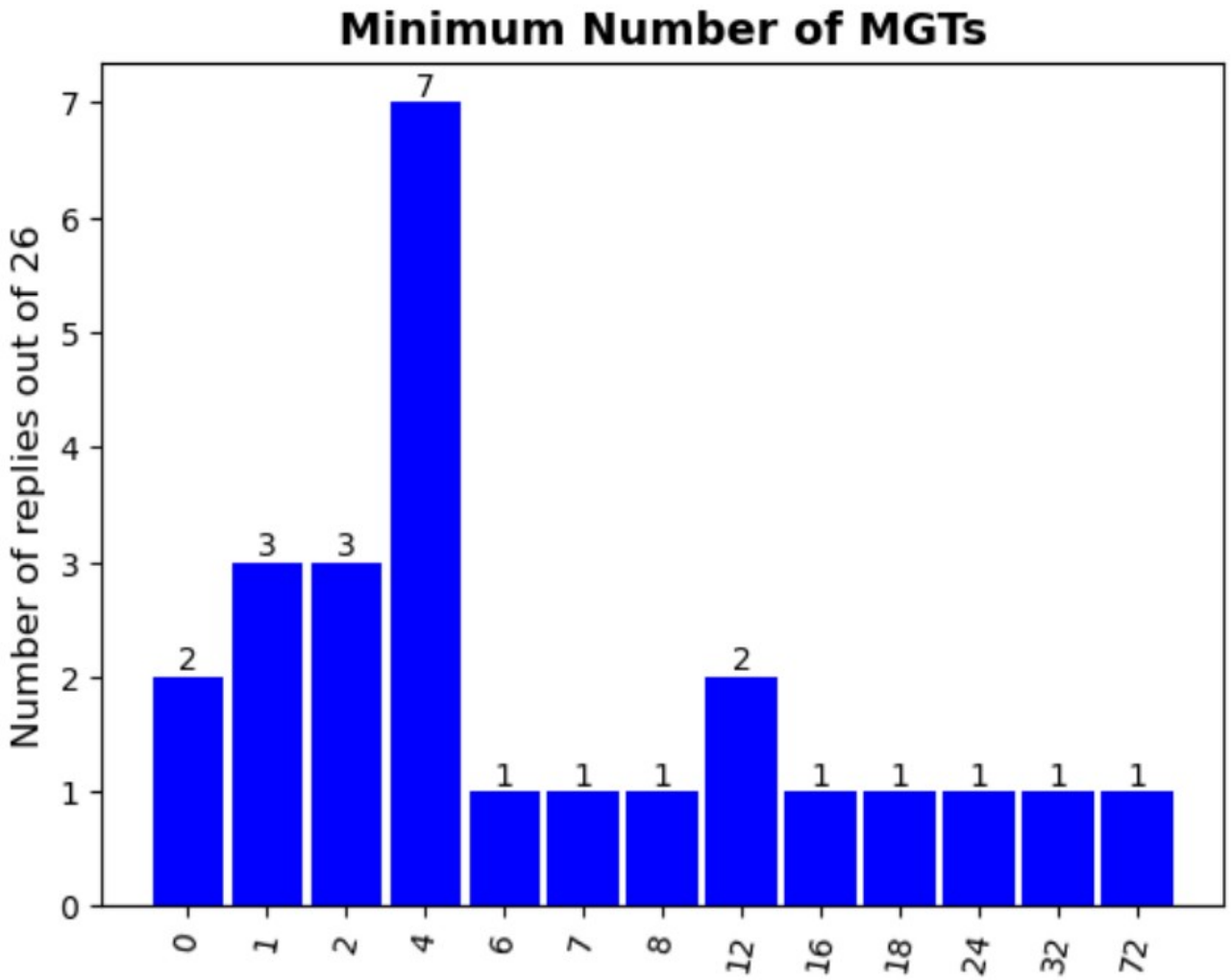


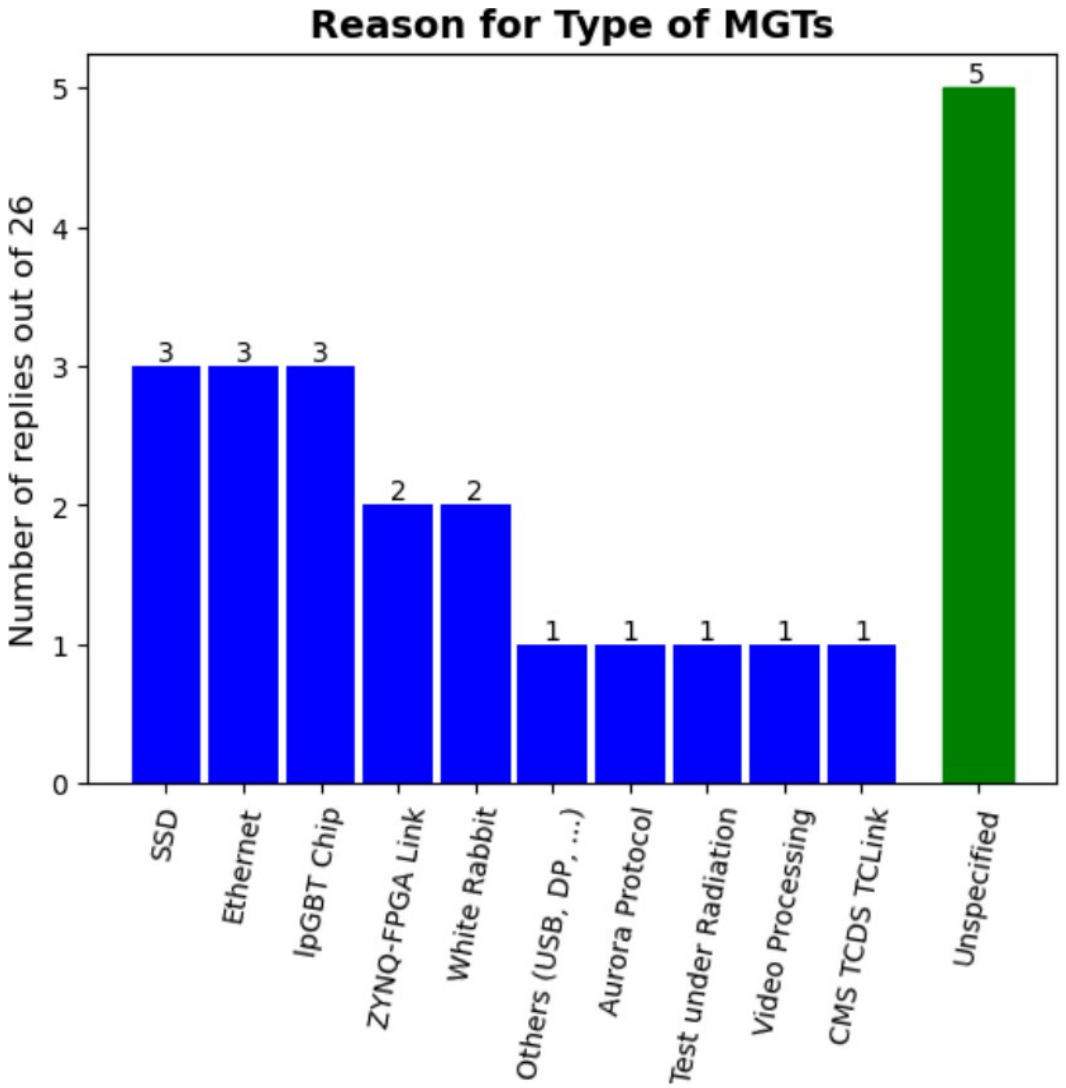
SoC choice and motivation





Gigabit transceivers

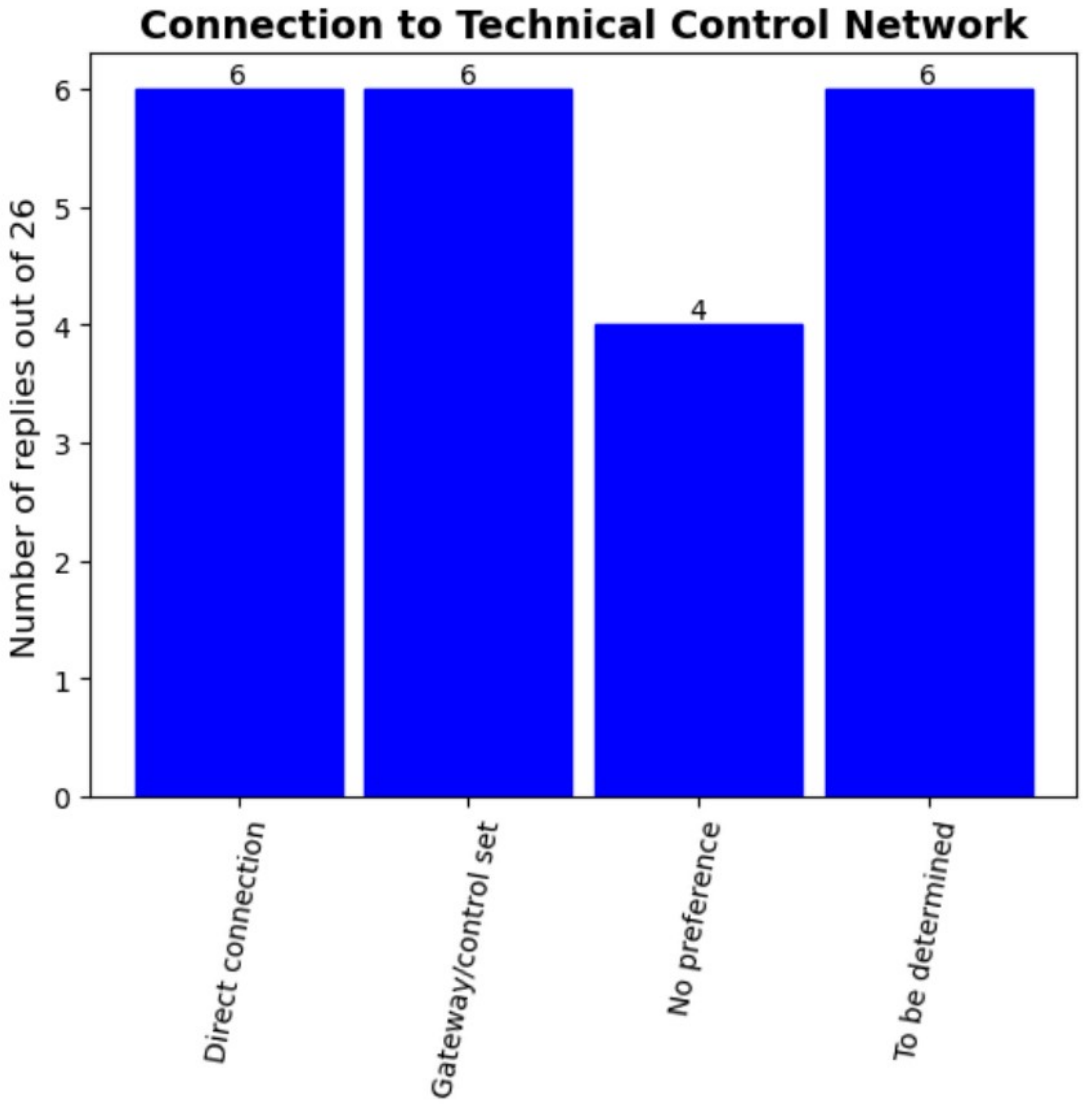




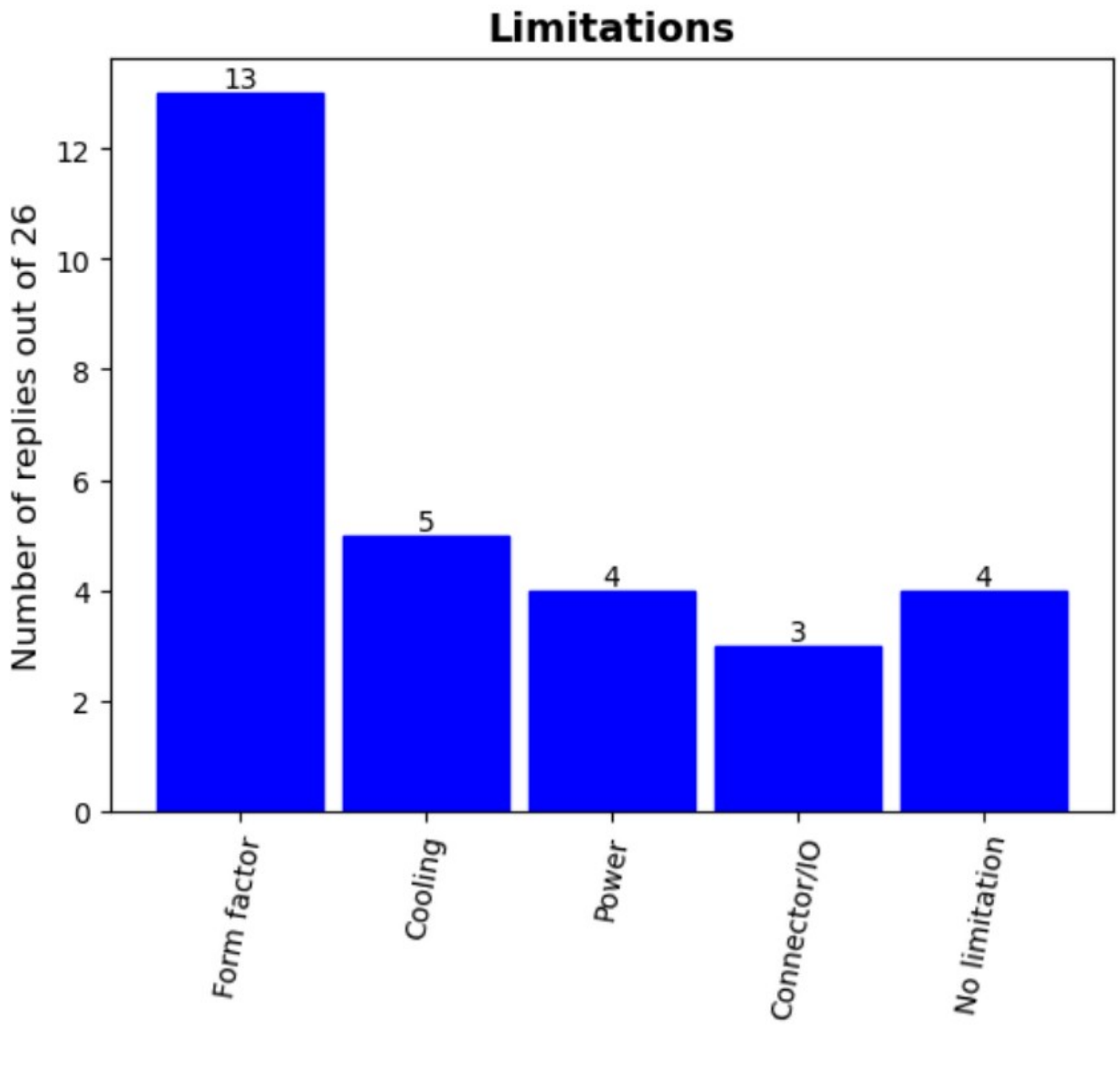
Operating system choice and requirements

- Everyone uses or plans to use Linux on regular Cortex-A cores
- Petalinux and/or CentOS are the popular choice
- A few projects have a need for real-time control, possibly with Cortex-R5 cores
- Different interpretations of real-time: from FreeRTOS, through bare-metal software to PL logic
- Out-of-the-box support for hardware was often mentioned (Xilinx IP, DMA, PMBus, some I2C devices)

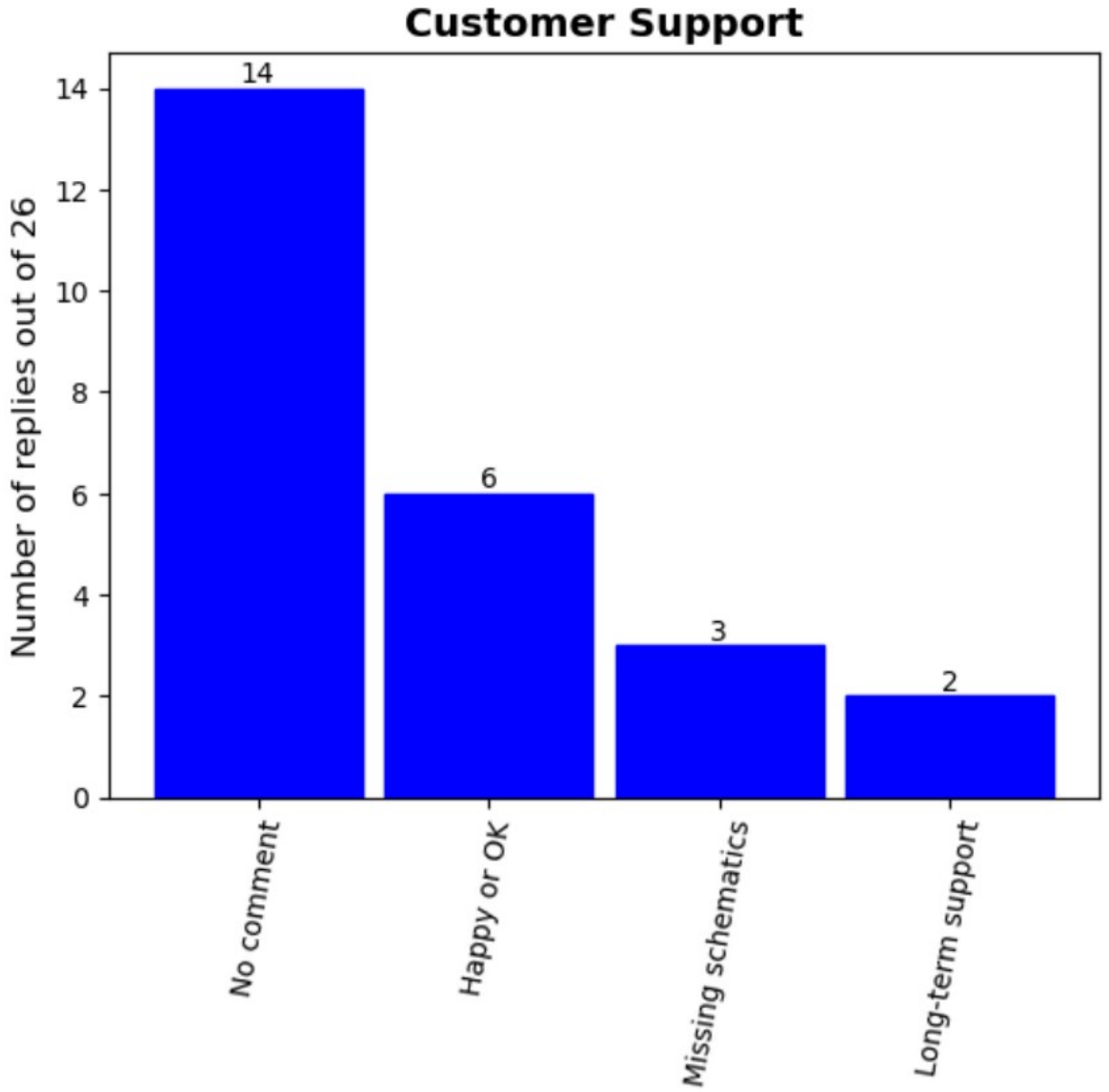
Technical network



Limitations



Customer support



- Most people are satisfied with customer support (or didn't need one)
- Missing or incomplete board schematics from some vendors
- Missing long-term support and outdated example designs

SoM wish list

- **Better clocking circuitry**
- **Common OS framework**
- Bigger eMMC storage
- Connector standardisation
- Complete design examples
- More powerful processor and better PS-PL coupling (e.g. latency)
- PL DDR memory
- Integrated cooling, multiple boot options, integrated IPMC

Conclusions

- SoM popularity is rising
- All teams use Xilinx SoC, majority of SoMs are from Enclustra, Trenz or Xilinx
- Choice driven by previous experience, reasonable cost and good support
- Long term support is a concern, partially due to vendor lock-in (non-standard connectors)
- Everyone uses Linux, common OS framework would be welcome
- Connectivity is important, some interfaces are ubiquitous (Ethernet, I2C, SPI, UART, JTAG)

Thank you!

We’d like to thank everyone who participated in the survey!

CERN