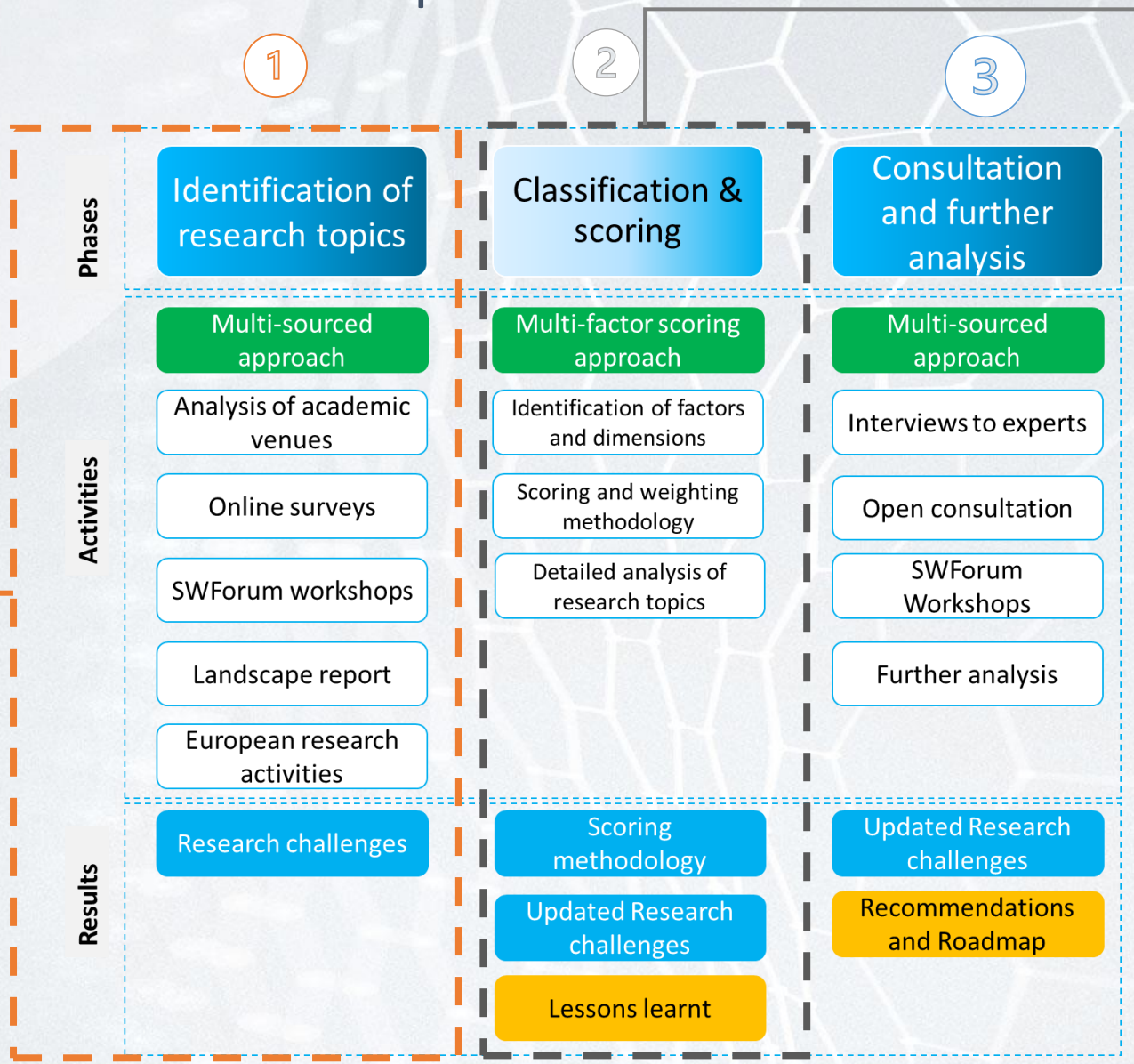
SWForum.eu

European forum of the software research community

Software Forum Research & Innovation Roadmap: The way forward in SW engineering

European forum of the software research community - SWForum.eu project has received funding from the European Union's Horizon 2020 - Research and Innovation program - under grant agreement no. 957044.

R&I roadmaps in SWForum.eu



D3.3 SWForum research roadmaps v1 (Nov 2021)

D3.4 SWForum research roadmaps v2 (Dec 2022)

European research roadmap in software technologies, including open-source software, digital infrastructure and cybersecurity

D3.5 SWForum research roadmaps v3 (June 2023)

Identification of research topics

1

D3.3 SWForum research roadmaps v1

Implementation of the first phase of the methodology "Identification of research topics"

Analysis of sources → Identification of research topics → Characterization of Research CH

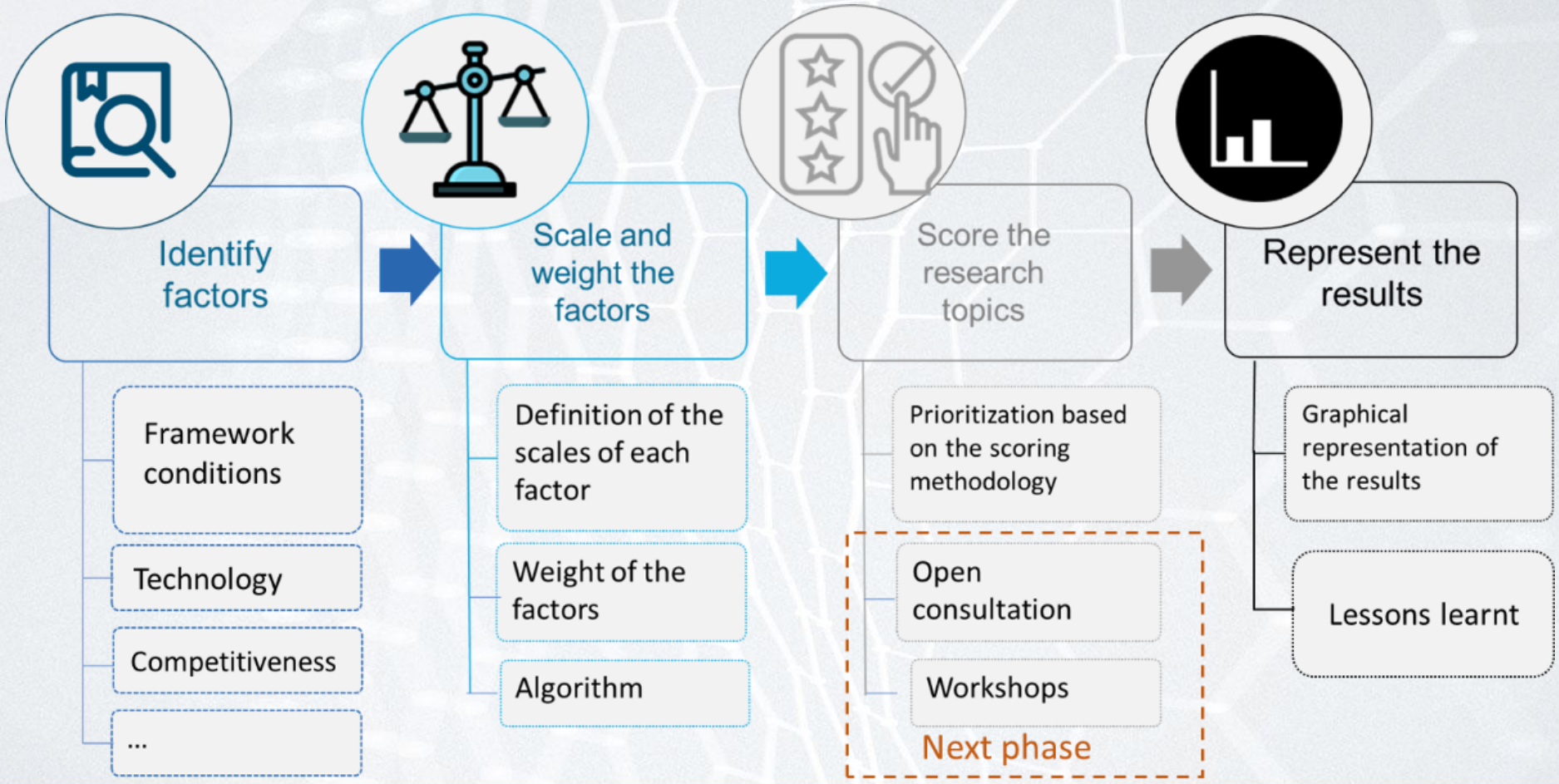
Google Scholar

European Commission

- CH1:OSS
- CH2: Self-healing
- CH3: CSE
- CH4:REQ & ARCH
- CH5: CYBER & Privacy
- CH6: Specific technology domains

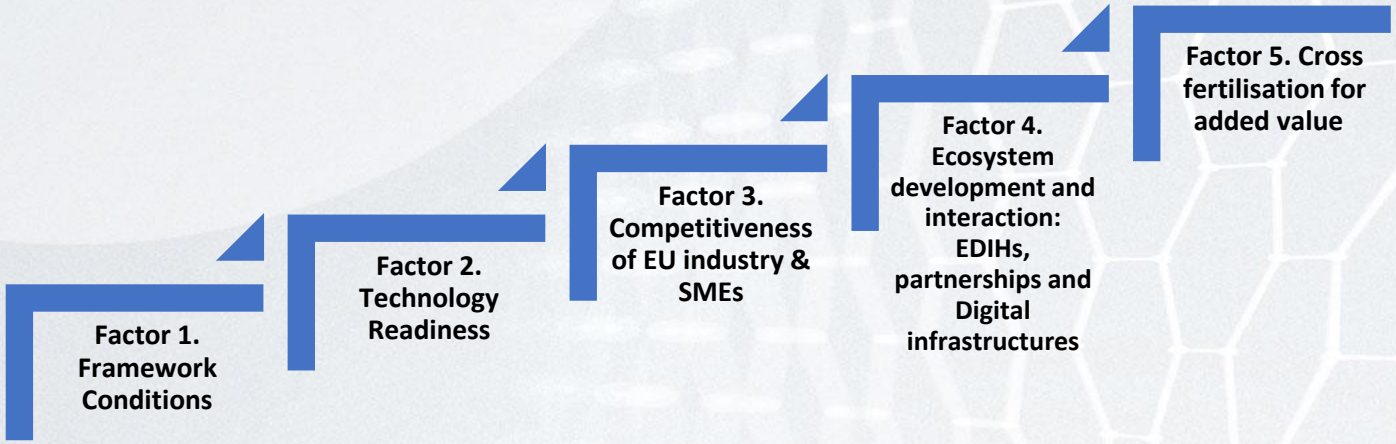
- Research challenge
  - Description
  - Expected time
  - Societal impact
  - Technological impact
  - Business impact
  - Source

2 Classification and scoring: Approach



2 Classification and scoring: Results

Methodological framework: Factors and Scoring methodology



Likert scoring, scale 1-5	
1	Strongly disagree
2	Disagree
3	Neither agree nor disagree
4	Agree
5	Strongly agree

Factor 1 Example

Factor 1: Framework Conditions for the given Challenge. Framework Conditions are assessed following two Criteria:

- **C1.1. Digital Decade 2030.** The potential alignment of the challenge, topic, and subtopics with the Digital Decade principles is assessed.
- **C1.2**. **Digital Compass.** The potential contribution of the challenge, topic, and subtopics to the priorities – skills, public services, business, infrastructures regarding the Digital Compass principles – are assessed and scored.
- An additional criterion has been suggested for the expert's validation, as there is not enough information currently on the existence of policies/strategies at Member State level for all the given challenges.

The way forward : Identified research challenges

Reviewed Research and innovation topics & their characterization

- Research challenge
  - Description
  - Research objectives
  - Research outcomes
  - Limitation of current practice
  - Research sub-topics

Open Source Software

OS for next generation technologies

- OS for quantum computing
- OS for AI
- OS for open data spaces

OS sustainability and interoperability with proprietary software

- Open standardised practices to develop, implement, test and validate OSS along the different phases of the SDLC and SOLC

Open-Source Computing Continuum

- Open Source Hardware and Open Source processors
- Open Source Computing Stack (Cloud-Edge-IoT)

Self-repairing and self-healing software (AI-enabled)

Towards “Cognitive” code

- Autonomous code repair and code adaptiveness(self healing code)
- Code error detection and prediction

Towards “Sustainable code”

- Sustainable consumption of infrastructural resources
- Smart and green code

Towards trustable code

- Cybersecurity threats detection through AI techniques

Continuous software engineering

Smart (re-) assurance

Agile and novel Co-engineering

Optimized DevOps

- From “one-size-fits all” to extended DevOps

Requirements, architecture and development

AI augmented software development

- Re-envisioned software development lifecycle
- Identify new forms of evidence of quality
- Automate design, evolution, and analysis tools

Engineering AI-Enabled Software Systems

- AI-enabled system specification methods
- Data management in support of AI-enabled systems
- Uncertainty management methods

Cybersecurity and privacy

Automatic (Cloud) Security Posture Management

Next generation risk assessment tools

- Based on AI and Quantum Computing capacities.

New and advanced architectures, technologies and methodologies to protect sensitive data in the computing continuum

Software Engineering for Quantum computing

Quantum software viability studies

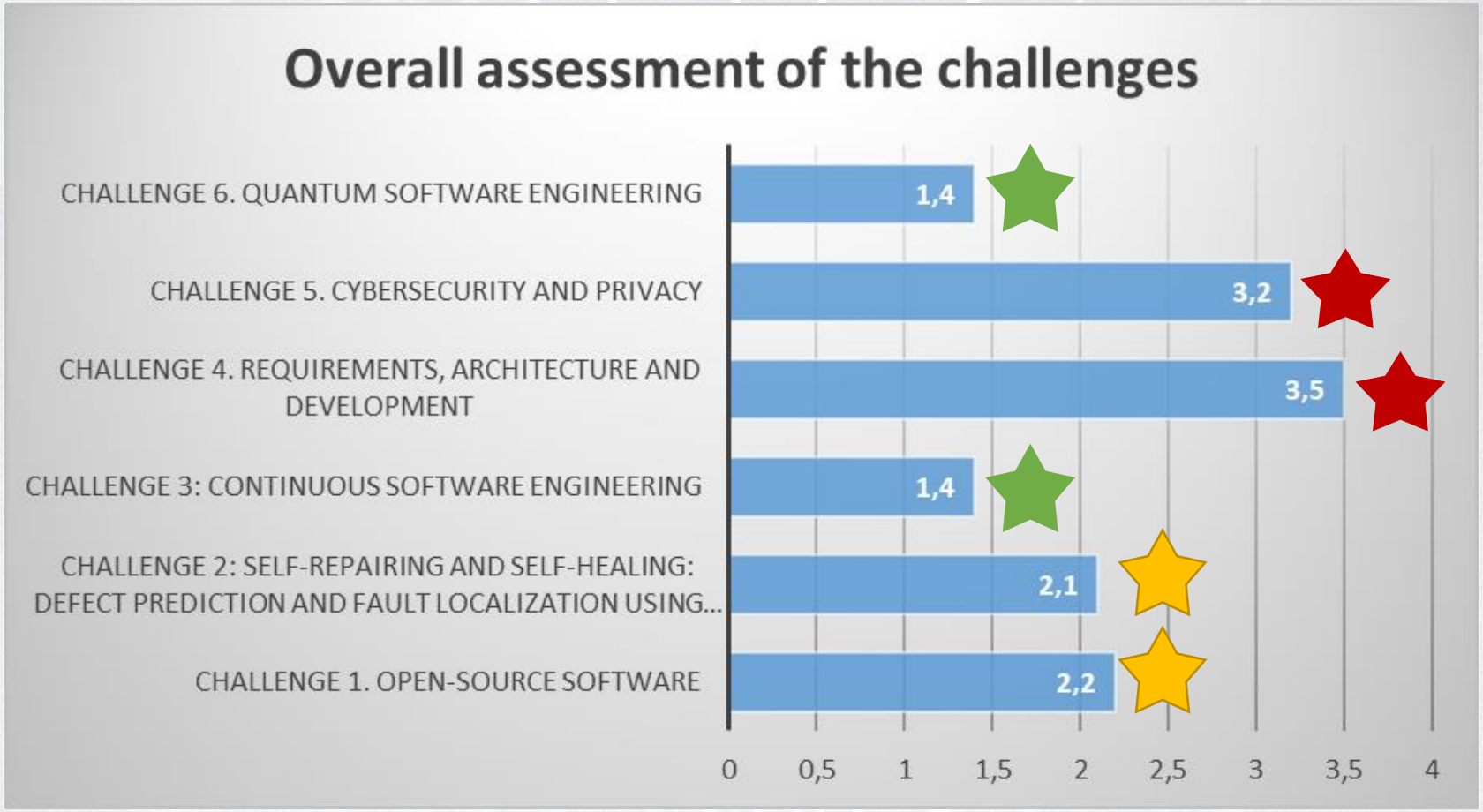
Quantum software architecture

- Middleware
- QaaS
- Quantum DevOps
- Quantum testing

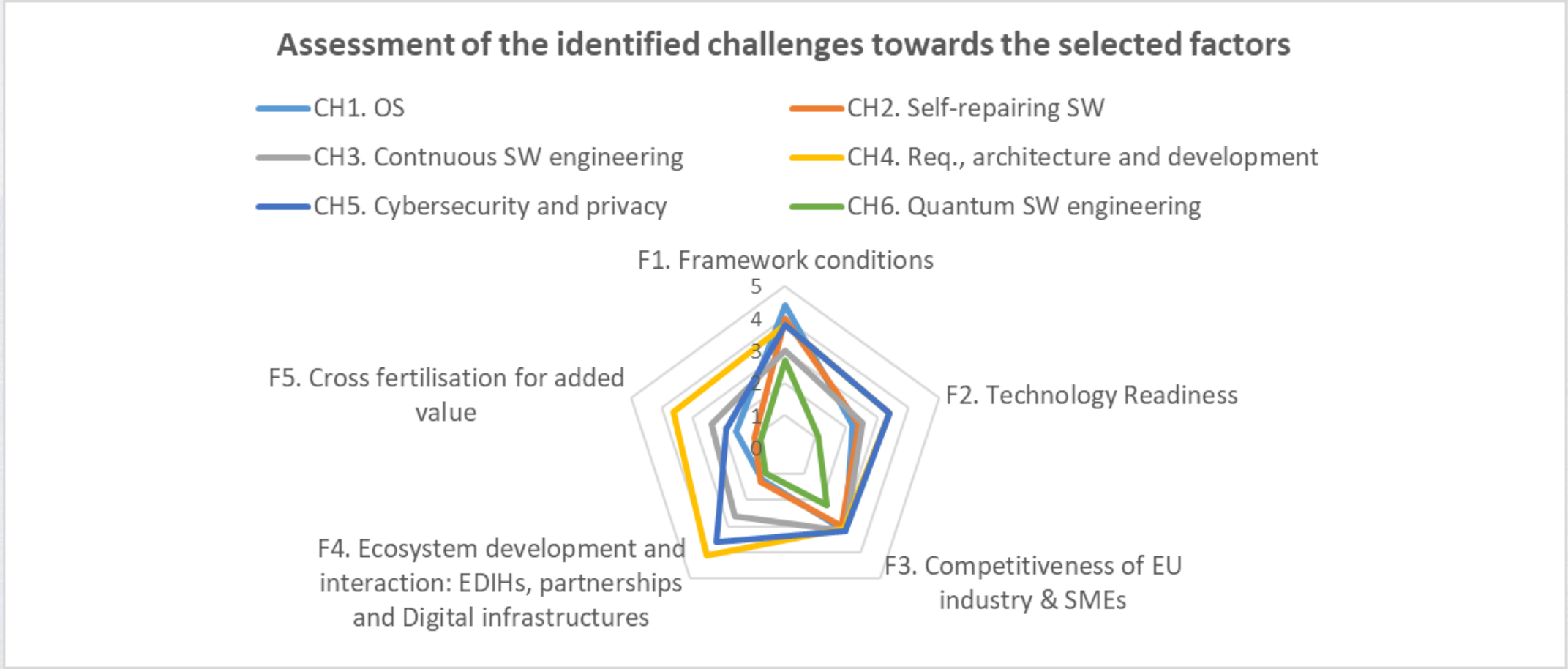
Quantum software interoperability

	F1.Framework conditions	F2.Technology readiness	F3.European competitiveness	F4.Ecosystem development	F5.Cross fertilization
CH1: OS	OS for Continuum Trusted OS, OS for advanced technologies, Sustainable OS OSHw	OS for Continuum, Sustainable OS, Trusted Os OSHw,OS for advanced technologies	Sustainable OS OSHw,OS for advanced technologies, OS for the Continuum, Trusted OS	OSHw,OS for advanced technologies, OS for the Continuum, Trusted OS, Sustainable OS	OSHw, OS for the Continuum, Trusted OS, Sustainable OS OS for advanced technologies
CH2: Self-healing	Cognitive Code Trustable Code Sustainable code	Cognitive Code Trustable Code Sustainable code	Cognitive Code Trustable Code Sustainable code	Cognitive Code Trustable Code Sustainable code	Cognitive Code Trustable Code Sustainable code
CH3: CSE	Smart re-assurance Co-Engineering Optimized DevOps	Smart re-assurance Co-Engineering Optimized DevOps	Smart re-assurance Co-Engineering Optimized DevOps	Smart re-assurance Co-Engineering Optimized DevOps	Smart re-assurance Co-Engineering Optimized DevOps
CH4:REQ & ARCH	AI augmented software development Engineering AI-Enabled Software Systems	AI augmented software development Engineering AI-Enabled Software Systems	AI augmented software development Engineering AI-Enabled Software Systems	AI augmented software development Engineering AI-Enabled Software Systems	AI augmented software development Engineering AI-Enabled Software Systems
CH5: CYBER & Privacy	(Cloud) Secure Posture Management Next generation risk assessment Sensitive Data in the CC	(Cloud) Secure Posture Management Next generation risk assessment Sensitive Data in the CC	(Cloud) Secure Posture Management Next generation risk assessment Sensitive Data in the CC	(Cloud) Secure Posture Management Next generation risk assessment Sensitive Data in the CC	(Cloud) Secure Posture Management Next generation risk assessment Sensitive Data in the CC
CH6: Quantum	Quantum feasibility Quantum architecture Quantum interoperability	Quantum feasibility Quantum architecture Quantum interoperability	Quantum feasibility Quantum architecture Quantum interoperability	Quantum feasibility Quantum architecture Quantum interoperability	Quantum feasibility Quantum architecture Quantum interoperability

SW engineering challenges: The way forward. Which research topics need more focus.



SW engineering challenges: The way forward. Analysis from the factors



SWForum statement

"Software and software technologies are the glue that holds together current and future key emerging technologies, such as quantum computing, post-classical computing and communications, augmented human activity, advanced AI, sensing and mobility, and the computing continuum, among others. All these trends will significantly impact the way software is designed, built, developed and consumed, opening a set of research challenges to be addressed in the coming years by the European software community."

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Your feedback is welcome!!

Thank You!

Get in touch with us!

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