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EoCoE-II

Energy Oriented Center of Excellence:
toward exascale for energy

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D7.4
Risk assessment contingency plan

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Executive Summary

This document presents the report of the risks identified during the project. The risks are presented in the order they were mentioned on the Participant Portal in the "Critical Risks for Implementation" tag, using their full name. To help the reader, the risk mitigation measures stated in the proposal are recalled, as well as the linked work packages and the initial severity assessment. In addition, we related each risk with the impacts which it might affect.

The goal of this deliverable is to analyse the different risks and the extent to which they actually materialized, as well as the impact they had on the project.

Beyond the risks that were initially determined, the EoCoE-II project was hit by an unexpected, unforeseeable situation, as the research team has been affected by the 2020 Covid-19 pandemic and the subsequent, European-wide lockdown. We strived to precisely determine the impact of this lockdown through means that are detailed in the “Risk 7” section of this deliverable.

Risk 1: Technology Changes

1.1 Proposed Risk-Mitigation Measures

Ensuring the EoCoE consortium works in agile development mode, with constant exchanges between partners and constant monitoring of progress, should allow the team to foresee relevant technological changes and provide us the necessary flexibility to adapt to such changes.

Should a critical technological change happen, the Exascale Co-Design Group will convene to determine the most efficient updated pathway, including resource retargeting, towards reaching’s the project’s goals.

1.2 Related impacts affected:

Impact 1: Enabling energy oriented applications on pre-exascale systems - The excellence of EoCoE’s applications is linked to the team’s mastery of the latest technology.

Impact 5: Train researchers/engineers to new HPC technologies - Attracting researchers to EoCoE’s training activities is a much easier proposition if the applications are in line with the latest technological developments.

1.3 Links to WP: 2, 3, 4, 5

1.4 Risk Severity: Medium

Likelihood is: Medium

Impact is: 3 over 4 (Medium to High)

1.5 Updated Risk Severity: low

M+12: Likelihood is: not likely; Impact is: 3 over 4

M+24: Likelihood is: not likely; Impact is: 3 over 4 (no change)

1.6 Final assessment

This situation has not materialized during the EocoE II project. EoCoE's integration within the global European exascale community, including the presence of several supercomputing centers in the consortium and the close relationship with the HPC Council means that the consortium is kept steadily informed on technological evolutions.

The project's agile framework, centered on the Exascale Co-Design Group, as well as the frequent WP and cross-consortium meetings, has allowed the team to foresee and adapt its work without any notable issue.

Risk 2: Technical Pitfalls

2.1 Proposed Risk-Mitigation Measures

The EoCoE team will make systematic and regular testing at increasing scale part of the work being done by the consortium. To better foresee these pitfalls, the team will port the EoCoE codes on various architectures during the full course of the project.

This systemic approach will ensure potential pitfalls are detected with enough anticipation to take the early corrective actions and limit their impact.

2.2 Related impacts affected:

Impact 1: Integrating new cutting edge HPC libraries in production applications; Porting applications to new European exascale technologies. - Application development would be severely hampered should the EoCoE team fail to foresee a technological pitfall.

Impact 2: Spread the use of exascale applications outside EoCoE-II consortium - Promoting EoCoE's applications would not make sense should they be impacted, and made less efficient, by a pitfall.

Impact 5: Train researchers/engineers to new HPC technologies; Exascale performance optimisation high-level training - Same as risk 1; attracting researchers for training activities is easier if the applications are not hampered by a lack of technological foresight.

2.3 Links to WP: 2, 3, 4, 5

2.4 Risk Severity: Medium

Likelihood is: Low

Impact is: 2 over 4 (Medium)

2.5 Updated Risk Severity: low

M+12: Likelihood is: not likely; Impact is: 1 over 4

M+24: Likelihood is: not likely; Impact is: 1 over 4 (no change)

2.6 Final assessment

This situation has not materialized during the EocoE II project.

Risk 3: Code base Fork: specific application dependent development required

3.1 Proposed Risk-Mitigation Measures

Forking a domain specific version would pose several issue, mostly because it would negatively impact the community-building effort of EoCoE II. While it would not directly impact the scientific work being carried out by the project's team, it would hamper our ability to gather a large research and industrial community, and it should therefore only be adopted as a last resort, and only after a thorough evaluation and consideration of other options.

3.2 Related impacts affected:

Impact 2: Spread the use of exascale applications outside EoCoE-II consortium

Impact 3: Provide a valuable SaaS service - EoCoE's software as a service portal's value would be diminished if the code available on it is not a widely-known one, as it would diminish its user base accordingly.

Impact 4: Federating capabilities and integrating communities around computational science in Europe - avoiding code base forking remains a good way to avoid dividing communities and guarantees easier community building endeavours.

Impact 5: Train researchers/engineers to new HPC technologies - code forking may diminish user base and hamper gathering participants for training activities

3.3 Links to WP: 3, 4, 5

3.4 Risk Severity: Low

Likelihood is: Low

Impact is: 1 over 4 (Low)

3.5 Updated Risk Severity: low

M+12: Likelihood is: not likely; Impact is: 1 over 4

M+24: Likelihood is: not likely; Impact is: 1 over 4 (no change)

3.6 Final assessment

This situation has not materialized during the EoCoE II project. No code base fork has been necessary.

Risk 4: Emerging competing solutions

4.1 Proposed Risk-Mitigation Measures

When it comes to the dissemination of results, and the promotion of EoCoE's approach, the consortium's core strength is its scientific excellence and prominence in the field of energy-focused HPC simulations. To ensure the project's visibility at the international level, strong dissemination actions will systematically be undertaken. Such actions will be amplified by EoCoE's collaboration with a scientific results booster, who will train EoCoE scientist so they become as versed as one can be in the promotion of their results.

Given how the project's partners are well integrated in their respective communities, the project's team should be fully aware of similar efforts, and wholly capable of setting collaborations when relevant.

4.2 Related impacts affected:

Impact 2: Spread the use of exascale applications outside EoCoE-II consortium - leading the way on its chosen topics will give the EoCoE consortium an advantage in terms of promoting applications.

Impact 3: Provide a valuable SaaS service - EoCoE's software as a service portal's value would be diminished if a competitor were to provide a similar tool, therefore dividing the attention of the potential industrial user base.

Impact 4: Federating capabilities and integrating communities around computational science in Europe - EoCoE's community-building effort will rely on the project's scientific excellence and prominence; competition would hamper these endeavours.

Impact 5: Train researchers/engineers to new HPC technologies - if a competitor were to attract EoCoE's potential trainees, our efforts would logically become less efficient.

4.3 Links to WP: 1, 3, 4, 5

4.4 Risk Severity: Low

Likelihood is: Low

Impact is: 2 over 4 (Medium)

4.5 Updated Risk Severity: low

M+12: Likelihood is: not likely; Impact is: 2 over 4

M+24: Likelihood is: not likely; Impact is: 2 over 4 (no change)

4.6 Final assessment

This situation has not materialized during the EoCoE II project. The EoCoE team never had to compete on its chosen topics.

Several of EoCoE's key scientists received training from META Group, a company that specializes in providing European-funded researchers the tools to maximize the dissemination of their work's results.

Risk 5: Unfulfilled agreement with EERA

5.1 Proposed Risk-Mitigation Measures

Given EERA's extensive network of critical actors, EoCoE's collaboration with EERA is, without any doubt, an important part of the project's impact on the energy sector. It is also a core aspect of EoCoE's long-term sustainability strategy.

Should this collaboration fail, the EoCoE team would have to devise networking and dissemination activities that would allow the set-up of a complex network with public and industrial stakeholders that could partially replace the functions envisaged for the EERA Joint Programme.

EoCoE's long term sustainability plan would have to be fully rectified, with new avenues to gather funds, whether through public funding or through new industrial collaborations. It would be a massive task, with very uncertain results.

5.2 Related impacts affected:

Impact 2: Spread the use of exascale applications outside EoCoE-II consortium - EERA's network of researchers and industrial actors is key to ensuring EoCoE's long-term impact.

Impact 3: Industry and SMEs dedicated to low-carbon energy and its variability, accessed through EoCoE-II pan-European network - Through EERA, EoCoE will be able to reach energy-focused industries and SMEs at a level few research projets can hope to.

Impact 4: Develop an integrated long-term vision for the HPC for energy sector - EoCoE's collaboration with EERA is seen as a transversal endeavor, promoting the use of HPC simulation to the European scientific energy community as a whole and ensuring the energy sector realizes the potential of HPC as a key tool.

5.3 Links to WP: 6

5.4 Risk Severity: High

Likelihood is: Low

Impact is: 4 over 4 (High)

5.5 Updated Risk Severity: high

M+12: Likelihood is: not likely; Impact is: 4 over 4

M+24: Likelihood is: not likely; Impact is: 4 over 4 (no change)

5.6 Final assessment

This situation has not materialized during the EoCoE II project. EoCoE and EERA have worked hand-in-hand, creating the EERA Joint Programme on "Digitalization for Energy" and publishing a joint position paper on these topics.

Risk 6: Change in European policy reducing funding

6.1 Proposed Risk-Mitigation Measures

Should European funding be reduced, the EoCoE team would have to look towards other national or regional funding tools and leverage them to continue the project on a smaller scale. This smaller scale approach could imply foregoing certain codes and / or institutions as part of the consortium.

6.2 Related impacts affected:

Impact 4: Federating capabilities and integrating communities around computational science in Europe- EoCoE's long-term vision will be altered if European funding of the work were to dry up, as it would hamper the pursuit of the collaborations made possible by the project's framework.

6.3 Links to WP: 7

6.4 Risk Severity: High

Likelihood is: Medium

Impact is: 4 over 4 (High)

6.5 Updated Risk Severity: high

M+12: Likelihood is: likely; Impact is: 4 over 4

M+24: Likelihood is: likely; Impact is: 4 over 4 (no change)

6.6 Final assessment

This situation has unfortunately materialized during the EoCoE II project. The change between H2020 HPC funding rules and their EuroHPC counterparts, as well as the strategic evolution of EuroHPC's 2022 calls, made keeping the consortium as it was during EoCoE II difficult, and the team had to let go of the "Meteorlogy for Energy" members during the writing of the EoCoE III proposal.

Furthermore, the EoCoE team found out the EoCoE III proposal had not been retained for funding during the summer of 2022. We are currently evaluating strategies to keep the collaborations going, but it seems obvious the consortium will not remain as strong as it was due to this unfortunate piece of news.

Risk 7: Work impacted by a worldwide pandemic

7.1 Proposed Risk-Mitigation Measures

The EoCoE team had to deal with the lockdowns affecting Europe in 2020 and 2021, and had to devise several strategies to limit the impact this situation had. These strategies included collecting a systemic feedback on the status of the team members, analyzing the monthly impact these

lockdowns had on their work, assessing the need for more time on the project and / or re-calibrating of certain aspects of the project.

Extending the project by six months proved to be the best course of action.

7.2 Related impacts affected:

All of them. During 2020 and 2021, scientific work was slowed down, community building was made more difficult because of the impossibility to convene in person, organizing in-person training activities was close to impossible, and promotion of results was hampered by the lack of physical events.

7.3 Links to WP: 1, 2, 3, 4, 5, 6, 7

7.4 Risk Severity: High

Likelihood is: High

Impact is: 3 over 4 (Medium to high)

7.5 Updated Risk Severity: Medium

M+12: Likelihood is: likely; Impact is: 3 over 4

M+24: Likelihood is: likely; Impact is: 1 over 4

7.6 Final assessment

This situation has materialized during the EoCoE II project. Its impact was contained through the six month extension of the project, which allowed the team to reach its goals, hence the low final impact.

Conclusion

In this section, the reader will find a table to sum up the previous pages.

As seen in the following tables, one unforeseen risk (risk 7) appeared during the EoCoE II project.

Evolution of the risk analysis from initial evaluation

Risks	Initial			Updated M12			Updated M24			Trend
	Likelihood	Impact	Severity	Likelihood	Impact	Severity	Likelihood	Impact	Severity	
R1	Unlikely	3	Medium	Unlikely	3	Medium	Unlikely	3	Medium	Steady
R2	Unlikely	2	Medium	Unlikely	2	Medium	Unlikely	2	Medium	Steady
R3	Unlikely	1	Low	Unlikely	1	Low	Unlikely	1	Low	Steady
R4	Unlikely	2	Medium	Unlikely	2	Medium	Unlikely	2	Medium	Steady
R5	Unlikely	4	High	Unlikely	4	High	Unlikely	1	Low	Better
R6	Unlikely	4	High	Likely	4	High	Likely	4	High	Worse
R7	Unlikely	3	High	Likely	3	High	Likely	1	Low	Better