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Demonstration of innovative forms of storage and their successful operation and integration into innovative energy system and grid architectures

AGISTIN
Advanced Grid Interfaces for innovative STorage INtegration

D1.3: First year risk management plan

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Executive Summary

The Risk Management Plan for the AGISTIN project outlines a comprehensive strategy to identify, assess, and mitigate potential challenges throughout the project's lifecycle.

The dynamic nature of research and innovation projects necessitates a proactive approach to risk management. This plan emphasizes continuous monitoring and adaptation to evolving circumstances. Regular assessments will be conducted to identify new risks, evaluate their status, and implement adjustments to mitigation strategies. The plan's agility lies in its ability to revisit and revise strategies based on lessons learned from project outcomes.

The AGISTIN Risk Management Plan focuses on maintaining resilience and ensuring project success amidst uncertainties. It includes strategies for mitigating critical risks associated with technological challenges, grid stability, and global component shortages. Alternative scenarios, fallback options, and enhanced testing environments have been identified to address potential disruptions.

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Introduction

Risk management is crucial in research and innovation projects to identify, assess, and mitigate potential challenges that could impact the successful completion of the project.
A thorough risk identification process and the implementation of the most effective countermeasures are crucial components of project proposal preparation and overall project execution. The key motivations for undertaking a robust risk assessment and management strategy include:

1. Uncertainty and Complexity: Research and innovation projects often involve high levels of uncertainty and complexity. Risks may arise from factors such as technological challenges, unforeseen obstacles, or changes in the regulatory environment. Effective risk management helps in navigating these uncertainties.

2. Resource Optimization: Identifying and addressing risks early in the project lifecycle allows for better resource allocation. By understanding potential challenges, project managers can allocate resources more efficiently, reducing the likelihood of delays or budget overruns.

3. Stakeholder Confidence: Stakeholders, including funders, collaborators, and team members, have a vested interest in the success of the project. A robust risk management process demonstrates a proactive approach to potential issues, enhancing stakeholder confidence and support.

4. Quality and Timeliness: Risks, if not managed properly, can lead to delays, compromised quality, or even project failure. Addressing risks promptly and effectively contributes to delivering high-quality results within the stipulated time frame.

1 Risk monitoring plan

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The right process for risk management in research and innovation projects typically involves the following steps:

1. Risk Identification:
   - Identify potential risks associated with the project, considering internal and external factors.
   - Utilize brainstorming sessions, expert opinions, and historical data to uncover potential risks.

2. Risk Assessment:
   - Evaluate the probability and impact of each identified risk.
   - Prioritize risks based on their significance to the project objectives.

3. Risk Mitigation:
   - Develop strategies and action plans to mitigate or minimize the impact of identified risks.

- Consider alternative approaches or contingency plans to address potential issues.

4. Risk Monitoring and Control:
    - Regularly monitor identified risks throughout the project lifecycle.
    - Implement control measures and adjustments to the risk management plan as necessary.

5. Communication and Reporting:
    - Maintain open communication channels with stakeholders regarding identified risks and mitigation efforts.
    - Provide regular updates on the status of risk management activities.

6. Documentation:
    - Document the entire risk management process, including identified risks, assessment results, mitigation strategies, and outcomes.
    - Use this documentation for continuous improvement and as a reference for future projects.

7. Continuous Improvement:
    - Regularly review and update the risk management plan as the project progresses.
    - Learn from the outcomes of risk management activities to enhance future project planning and execution.

By integrating a comprehensive risk management process into research and innovation projects, organizations can enhance their ability to address challenges effectively, improve project outcomes, and increase the likelihood of success.
While steps 1 to 3 are primarily implemented during project proposal preparation, they are also regularly updated throughout the project. The active part of AGISTIN project's risk management during execution focuses mainly on continuous monitoring, reporting, and documentation, as well as the ongoing update of identified risks and their related mitigation actions.
The objective of this deliverable is to:

- In Chapter 2, report the list of critical risks identified and assessed during the proposal preparation.
- In Chapter 3, describe their current status and any activated countermeasures.
- In Chapter 4, present the continuous improvement of the risk management plan, including newly identified risks and associated countermeasures.

2 AGISTIN critical risks and mitigation measures

In Table I we report the list of identified critical risks and the proposed mitigation measures. The list includes all critical risks identified during the project proposal preparation and the intial set of countermeasures defined for each risk.

Table I – Critical risks and proposed mitigation measures

Risk num	Description of risk *(level of likelihood to happen/ of severity: Low/Medium/High)*	WP	Proposed risk-mitigation measures
1	Issues delivering the Aqueous ECR delay or prevent testing and demonstration activities (Medium/Medium)	4,5,6	An active risk management approach will be employed between GSR and the consortium to identify and mitigate scope and timeline deviations. In the case that core project activities are delayed, or cancelled alternative storage batteries will be sourced as appropriate.
2	Issues providing or delivering the Aluminium Ion battery delay or prevent testing activities (Medium/Medium)	6	An active risk management approach will be employed between the Al battery supplier and the consortium to identify and mitigate scope and timeline deviations. In the case that core project activities are delayed, or cancelled alternative storage batteries will be sourced as appropriate.
3	SHL's green hydrogen site at Emmen is not built. (Low/Medium)	5	Smaller green hydrogen production (50 kW electrolyser, 70 kW PV) site close to Amsterdam is the fallback option.
4	SHL's green hydrogen site at Emmen will not have a battery. *(Low/Medium)*	5	GSR will check for contribution and support if this risk materialises. The set-up at Emmen with a large battery can be studied at grid emulator of PQ4Wind at FHG-IWES.
5	Stakeholder not willing to share technical needs necessary for best storage evaluation *(Medium/High)*	2	Expand the advisory board and enlarge participating stakeholders.
6	Reluctancy of regulator to change rules that would allow for a new business to emerge. *(Low/High)*	2	Attract more TSOs and end users to show that the new business models can be beneficial for both.

7	Up-to-date data on the location of industrial grid users within the electric power grid might be hard to come by. (Medium/Low)	3	Include more stakeholders in the survey to avoid uncertainty and reflect sufficient regional/geographical differences in the results. Create and evaluate multiple scenarios if huge uncertainty remains.
8	The cost and organisational overhead of establishing a common AGI amongst different stakeholders is higher than anticipated. (Medium/Medium)	3	Diversification of sources of cost risks shall be considered in the AGI design.
9	The usefulness of the published models might be limited due to the prevalence of different (partly incompatible and partly closed source) simulation software. (Medium/Low)	3	Reengineer models that are not useable in the currently available implementation. Purchase commercial simulation software to validate the reimplementation.
10	No uniform electrical equivalent circuit of different electrochemical storages captures the assets dynamics appropriately. (Medium / Low)	3	Design process needs to be more tailored to each individual application.
11	The AGI controls cannot be designed subject to the given IT requirements and proprietary device-model knowledge. (Medium/High)	3	The AGI equipment specifications have to be revised or less ambitious ancillary service objectives have to be addressed.
12	Results from T2.2 are not complete for GFI storage with AGI. (Low/Low)	4	Collaboration with WP3 will find requirements for AGI with GFI. GFI requirements are established at FHG.
13	The connection of many different converter-driven systems can lead to unwanted interactions and instabilities of the test system. With that the validation of use cases may not be realised. (Medium / Low)	4	Reduce the complexity and determine which use cases are most important for business cases and realisation. Prioritization of use cases to meet project goals.
14	The inverter used to connect the high-performance battery is unable to follow the fast dynamics of the battery. The impact on the GFI or the OBC can therefore not be accurately assessed. (Low / Low)	4	Revision and adjustment of the control to increase the dynamics. Replacing the battery with a commercial battery system or a battery emulator. Adjust the results to higher performances by simulations.
15	Unpredictable delay in the production and delivery of laboratory equipment, measuring equipment, power converter and battery components due to the ongoing component shortage. (Medium / Medium)	4	Early planning & prioritization of test scenarios with available components and devices earlier in the schedule. Evaluation of alternative components and devices.
16	No or large delays of the electrolyser for SHL's green hydrogen site at Emmen (Low/Medium)	5	Fallback option of the smaller site of SHL close to Amsterdam (see above).

17	An issue with the electrolyser reducing availability (Low/Medium)	5	Support by hydrogen expertise from FHG-IWES. Knowledge about electrolysers will be backed up by the three hydrogen labs at FHG-IWES.
18	Insurance or warrantee issues with the electrolyser or battery if we connect in on the DC rail. (Low /Low)	5	A common dc-connections will be studied at PQ4Wind on the inverter if the dc power stays within the safety protection limits.
19	The DC or AC dynamics are not well represented by the PQ4Wind emulator (Low/Medium)	5	More options for multiple tests at SHL's site will be explored.
20	Hitting computational limit of the RT-Boxes for the PQ4Wind test bench. (Medium/Low)	5	Two measures are possible: 1) Models will be adapted to reduce the computational effort 2) More RT-Boxes will be purchased to facilitate the required power.
21	Irrigation community does not allow to do the testing due to policy change. (Low/High)	6	1) Find other irrigation communities to perform the installation (across Catalonia or Spain). 2) Perform lab tests with real system emulators (real data).
22	Grid operator does not allow to do the testing. (low/ medium)	6	Perform tests in a real off-grid environment, using a grid emulator. Real systems will still be involved. Additional tests could be conducted (frequency/voltage variation tests, faults, etc.).
23	Use of real devices restricted. (Low/Medium)	6	Use of emulation systems to represent such devices, based on real data operation.

3 Critical Risks status

In the Table II we report the status of each identified critical risk and eventually if the needed countermeasures have been defined and are being ACTIVATED.
The risk status types are the following:

- Inactive: the ris has been identified but has not materialized;
- Under observation: early indicators of possible activation of the risk have been identified and areing monitored;
- Active: the identified risk has materialized and is being dealt with.

Table II – Risks and countermeasures status

Risk number	Risk Status	Countermeasure Status
1	Active	Enforced
2	Active	Enforced
3	Active	Enforced
4	Inactive	Planned
5	Under observation	Updated
6	Inactive	Planned
7	Under observation	Updated
8	Inactive	Planned
9	Inactive	Planned
10	Inactive	Planned
11	Inactive	Planned
12	Inactive	Planned
13	Inactive	Planned
14	Inactive	Planned
15	Under observation	Updated
16	Under observation	Updated
17	Under observation	Updated
18	Inactive	Planned
19	Inactive	Planned
20	Inactive	Planned
21	Inactive	Planned
22	Under observation	Updated
23	Inactive	Planned

The countermeasures, which have been initially defined together with the risks during the project planning, are being further delineated for the risks under observation (Planning) and eventually executed for active risks (Enforced).
In the following sections the detailed description of the risk status, for the under monitoring and active risks, will be described and the identified countermeasures will be explained.

3.1 Critical Risk 1

3.1.1 Risk status

The aqueous battery developed by Geyser (GSR) is being developed and characterized in laboratory environment, starting from the single cells and moving towards the full module and battery pack characterization. This activity is being prioritized by GSR in order to provide the needed input data for the modelling activities as well as for the setup of the laboratory demonstrations of AGISTIN concepts.

3.1.2 Countermeasure status

Geyser has identified the necessary steps to complete battery characterization and assembly, quantifying potential delays and informing involved partners. The focus is on in-house cell characterization for data collection. The WP4 test setup in Fraunhofer laboratories can be independently prepared and proceed with initial testing even without a battery. Fraunhofer has identified parallel activities and prioritized them. Once cell characterization is completed, lab testing for WP5 can be prepared, and preliminary tests can be conducted.

3.2 Critical Risk 2

3.2.1 Risk status

The initially identified Aluminum-Ion (Al-Ion) battery provider has communicated that the desired characteristics, in terms of power rating and energy storage capacity, cannot be met within the available timeframe.

3.2.2 Countermeasure status

Given the technical shortcomings of the Al-Ion battery provider for the field demo, alternative battery solutions have already been identified, and the procurement process is underway. The alternative battery technology selected is a Redox Flow Battery, which has been selected for its known characteristics and the experience on its use already matured in previous projects.

3.3 Critical Risk 3

3.3.1 Risk status

Final Investment Decision (FID) for the EMMEN test site is delayed and this could be a risk with respect to desired timeline for the demo campaign execution.

3.3.2 Countermeasure status

As part of the initial mitigation measure, the Energy Transition Campus Amsterdam (ECTA) has been identified as an alternative demo site. The design of the demonstration campaign in ECTA is completed and its deployment is being executed, enabling smaller-scale testing of AGISTIN solutions. Additionally, simulations have been defined and prepared for execution to scale up results.

3.4 Critical Risk 5

3.4.1 Risk status

Although this critical risk has not yet materialized, the results of activities in WP2 aimed at identifying requirements and business opportunities for AGISTIN, particularly the AGI role, provided valuable feedback. There is a growing interest in interconnecting storage, generation, and loads using a shared and controllable DC bus like the Advanced Grid Interface (AGI) developed in

AGISTIN. However, there are very few solutions already adopted and developed, resulting in limited and partial answers from the questionnaire within Task 2.2.

3.4.2 Countermeasure status

The planned countermeasure of expanding the AGISTIN Advisory Board has been updated by identifying additional types of stakeholders to be invited, especially hardware manufacturers and domain-specific users such as Data Center operators, Irrigation Communities, and System Integrators. An additional countermeasure involves planning a dedicated workshop to follow up on the technical requirements identified through the questionnaire.

3.5 Critical Risk 7

3.5.1 Risk status

Similarly to Critical Risk 5, in this case, the results of the activities conducted in Work Package 2 (WP2) have revealed potential challenges in accessing up-to-date data. Although Critical Risk 7 has not materialized thus far, the project has opted for a proactive approach and has updated the mitigation actions.

3.5.2 Countermeasure status

The mitigation plan has been strengthened by incorporating additional scenarios, encompassing the monitoring of various applications and scales.

3.6 Critical Risk 15

3.6.1 Risk status

Given the global widespread shortage of components and devices, the project has chosen to closely monitor this critical risk and update the associated mitigation actions.

3.6.2 Countermeasure status

The mitigation plan also involves early planning and prioritization of test scenarios using available components and devices. There is also consideration for anticipating or rearranging the testing schedule. Additionally, alternative components and devices will be explored as part of the mitigation strategy.

3.7 Critical Risk 16

3.7.1 Risk status

This risk is interconnected with Critical Risk 3 and its updated mitigation plan.

3.7.2 Countermeasure status

The Energy Transition Campus Amsterdam (ECTA) site is already being configured as an eventual fallback option.

3.8 Critical Risk 17

3.8.1 Risk status

Critical Risk 17 is under constant monitoring, particularly concerning the possibility of being obligated to utilize the fallback option for the green hydrogen production demo.

3.8.2 Countermeasure status

To preempt disruptions or delays, the mitigation plan has been expanded to encompass support from hydrogen expertise at FHG-IWES. This support is intended to back up the requirements for data and knowledge about electrolysers, leveraging the three hydrogen labs at FHG-IWES.

3.9 Critical Risk 22

3.9.1 Risk status

Given the limited testing opportunities at the connection point to the main distribution grid in Segria Sud, an alternative test grid has been identified for conducting tests of critical scenarios.

3.9.2 Countermeasure status

Partners will carry out tests in a genuine off-grid environment, utilizing a grid emulator that still involves real power system components. The emulator enables the execution of additional tests to replicate critical scenarios, including variations in frequency and voltage, faults, and other relevant conditions.

4 Conclusion and future work

A resilient risk management plan for the AGISTIN research and innovation project recognizes the need for continuous adaptation throughout its lifecycle.
monitoring will be conducted to identify new risks, assess their status and evolution, and implement necessary adjustments to mitigation strategies.
The plan will also be revisited and revised based on insights gained from the project's outcomes.
This agile and iterative approach ensures the risk management plan remains dynamic, enhancing its effectiveness in navigating uncertainties and contributing to the project's overall resilience and success.
The final comprehensive report on the project's risk management activities will be published with Deliverable D1.4, scheduled for release in month 48 of the project.