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Architecture for Scalable, Self-human-centric, Intelligent, Secure, and Tactile next generation IoT

assist-iot

D2.5 – Risk Management v1

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Version	1.0	**WP**	WP2
Description	The deliverable includes the risk policy, forecasted and detected risks and their mitigation measures, along with ethical and legal risks.		

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Executive Summary

This Risk Management Plan is written within the context of WP2 – Project Coordination and Management of **ASSIST-IoT** project, under Grant Agreement No. 957258. The document is a reference to the work being carried out as a part of task *T2.2 - Technical coordination, quality assurance and risk management*. In particular, it is related to the management and assessment of risks of the ASSIST-IoT project. This document contains the first full report of the risk management related activities that have been, are and will be performed throughout the ASSIST-IoT lifetime. In particular, it summarises the current status of the risk assessment, as it has been performed during the M9 of the action (July 2021).

The Risk Management Plan is based on a well-known 4-steps procedure composed of identification, estimation, mitigation and monitoring. All sub-steps have been considered in this document, while the most relevant part is presented in two tables, with information associated to specific risks that have been identified.

By M9 of the project (July 2021), 17 risks have been identified (classified in 6 administrative/managerial and 11 technical). They are detailed in two summarising tables. Identified risks are, mostly, the usual risks associated with the first stages RIA projects. In majority of cases these risks have been predicted already in the project proposal, while their status have been updated, if needed, in this document.

Currently, no high warning risk(s) have been identified, and all detected risks are “under control”. However, continuous tracking of the status of identified risks, and identification of new ones is being undertaken. Specifically, this document will be updated/modified as it (already) is a living document (in continuous update) and will be used as a guide to the day-to-day work in terms of risk management.

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List of acronyms

Acronym	Explanation
AB	Advisory Board
AI	Artificial Intelligence
ASSIST-IoT	Architecture for Scalable, Self-*, human-centric, Intelligent, Secure, and Tactile next generation IoT
CA	Consortium Agreement
COVID / COVID19	Disease caused by SarsCOV2 virus – refers to the outbreak of 2020 and 2021
CSA	Coordination and Support Action
DevSecOps	Development-Security-Operations, methodology for Secure Continuous Integration and Continuous Delivery.
DX.Y	Deliverable No X of Work Package No Y
GA	Grant Agreement
IEEE	Institute of Electrical and Electronics Engineers
KPI	Key Performance Indicator
ML	Machine Learning
M*X*	Month No *X* of ASSIST-IoT project execution
N/A	Not Applicable
PC	Project Coordinator
PCC	Project Coordination Committee
PIC	Project Implementation Committee
PO	Project Officer
R*X.Y*	Risk No Y of WP No X
SotA	State-of-the-Art
TC	Technical Coordinator
TL	Task Leader
WP	Work Package
WPL	Work Package Leader

1. About this document

The main objective of this document is to provide update of all aspects of risk management. As stated in the action proposal, the aim of ASSIST-IoT management is to systematically monitor risks, and to establish ways of counteracting them before they have adverse effect on the action's results.

1.1. Deliverable context

Table 1. Deliverable context

Keywords	Lead Editor
Objectives	The objective of this document is not related to the technical development of the project. This deliverable establishes the Risk Management Plan and the main procedures proposed to correctly manage the likelihood of risk materialisation in a continuous and timely manner.
Exploitable results	N/A
Work plan	This document is developed at the beginning of WP2 "Project Coordination and Management", being useful for every task of the project and a daily reference of overall project planning and coordination. This document corresponds to the works carried out under the scope of task *T2.2 - Technical coordination, quality assurance and risk management.*
Milestones	N/A
Deliverables	This document will be a live asset (living document), subject to be updated. Current version can be seen as an update performed on risk assessment provided in the action proposal. Moreover, it is fed directly from the Project Management Handbook (D2.1). Furthermore, this document is semi-independent from D2.3, which covers and deals with all aspects of ethical risks. Hence, ethical risks are not considered here. It will be iterated (enhanced, updated) by deliverables D2.6 (M18) and D2.7 (M27).
Risks	**Planning problems** – This deliverable establishes mechanisms to ensure the quality of the documentation and the processes, facilitating the correct interpretation by the partners so that they know the timing and responsibilities.
	Collaboration issues – This deliverable describes coordination mechanisms, communication tools, and procedures that allow correct decision-making and conflict resolution in the face of any situation that may arise throughout the project.

1.2. The rationale behind the structure

The content of the deliverable is organized in six main sections:

- **Section 2**. The risk management strategy is described, making proper references to inner procedures and summarising the work that takes place in the risk management task in ASSIST-IoT.
- **Section 3**. This section reports the current status of risks assessment in the project.
- **Section 4** concludes with some reflections and next actions about how the risk management is effectively performed in ASSIST-IoT.
- **Appendix A**, is a supplementary document that provides more details about ASSIST-IoT approach to risk management.

2. Risk Management in ASSIST-IoT

Project management approach, undertaken within ASSIST-IoT includes serious treatment of risk management, which is treated as an ongoing activity. Hence, risk identification, risk status update, establishing (and updating) proper risk mitigation strategies is a key element to prevent and mitigate potential risks and, if needed, ensure efficient implementation of corrective actions.

While it is not possible to predict all possible risks, an initial set was identified in the proposal and updated within deliverable D2.1 (Project Handbook). Since risk-related material is treated as a living document, this deliverable starts from D2.1 and provides self-assessment of current status of risks, and their mitigation strategies. Moreover, it will be further updated in deliverables D2.6 (M18) and D2.7 (M27).

The ASSIST-IoT philosophy for Risk Management is based on the following tenets:

- ***Effective management***: management structures and procedures (as outlined in the GA/CA, and D2.1) ensure that action management can closely supervise delivery of expected results. Here, note that the ASSIST-IoT Consortium is composed of majority of organisations, which have already successfully carried out EU actions. Moreover, they had already worked together (in various groups/configurations), hence they know each-other, also personally. It can already be observed that this helps in delivering the expected results. In particular, this works very well between partners with long history of cooperation. In this context, the effective management has been translated in a risk management structure plan, composed of four steps: identification, estimation, mitigation, and monitoring (see, **Appendix A** for further details).
- ***Risk tracking***: Critical risks for implementation have become a "living document" (expressed as this deliverable), which will be systematically updated to track new, potential contingencies, and oversee possible remedies to new, unforeseen and persisting risks. Here, an example of how this process is going to materialise is how the content of Project Handbook (D2.1) is updated in this document.
- ***Contingency planning***: Initial work plan has been designed for effective contingency planning, in case of all identified risks. For every risk, a specific strategy has been proposed. First, avoid risk (i.e., reducing probability of its occurrence). Second, in the case of risk materialisation, minimise its impact. Note that partners (PC, in particular) have experience of successfully dealing with in-project contingencies. For executing such a contingency planning, though, the team first needs to analyse the occurrence likelihood of each risk and the potential associated impact that such materialisation can entail to the project.
- ***Multiple loosely coupled objectives***: Finally, even if the goal of ASSIST-IoT is to demonstrate full operation of all promised solutions, in case of materialisation of most damaging risks, individual results/components can be decoupled and exploited independently, delivering value (a **"**mitigation procedure**")**. Here, actions leading to maximisation of value of individual results will be consulted with the Advisory Board and the Project Officer. It should be also stressed that, at this stage of the project (M9) potential highly damaging risks have not been observed.

In order to help their identification, project risks have been divided into: **Project Management and Organisation** (likelihood of failure to meet project milestones) and **Technical** (likelihood of failure of development process). In the next two Tables, **updated** (as of M9) information about the risks, identified until the moment of submission of this document, and their associated information, is provided.

3. Current risk assessment tables

Table 2. Management related risks in ASSIST-IoT

Management related risks	WP	Proposed Risk mitigation measures
Partners related risks – underperforming, leaving the project, key-personnel temporally not available, reorganization distracting day-to-day activities.	WP2, ALL.	Flexible project management structure and project CA allow quick shift of resources to alternate partners, and quick inclusion of new partners in the Consortium, if necessary.

COVID-19 increases possibility of materialization of these risks. Moreover, partners may be overburdened by the success/failure related to the COVID pandemics (too many/too few activities). Related also to the next risk. Possibility, as assessed at M9: *low*. *No symptoms detected.*		All Consortium partners are involved in related areas with more than one staff member, ensuring an immediate substitution. COVID-related aspects of these risks, and possible mitigation approaches (including importance of the need of efficient communication) have been discussed during the Kick-off meeting, and have been acknowledged by the partners. So far, no need to elaborate this risk further occurred.
Planning problems – resources underestimated, project timing not appropriate, deliverables/milestones delayed. Possibility, as assessed at M9: *low*. *No symptoms detected.*	WP2, ALL	Potential solutions: involvement of other partners with available resources, rearrangement of resources among partners, change of project plan, as a result of self-assessment activities (in direct communication with the EC / Project Officer), and ensuring timely implementation of corrective actions
Communication issues – lack of direct (personal) contact (due to COVID pandemics travel restrictions) leads to problems in in-depth understanding between partners. Particularly "dangerous" when partners are involved in "joint activities". Possibility, as assessed at M9: *high.* *Some symptoms detected.* This risk will be monitored with high level of involvement by the PC/TC and the PCC/PIC, in upcoming month.	All	Potential problems related to/originating from lack of personal communication have been discussed during the Kick-off meeting, and acknowledged by all partners. The PC and the TC pay particular attention to the way partners are communicating, and the common understanding is achieved. Initial problems in reaching appropriate level of common understanding between WP/Task leaders, and partners involved in these WPs/Tasks, have been observed. As a counter-measure, extra teleconferences (involving "handpicked" groups of partners) have been introduced to mitigate effects of materialization of this risk. Positive effects of these teleconferences have been observed. For instance, there are no delays in project schedule, while the quality of deliverables is adequate. However, the very fact that the risk has started to materialise requires extra attention.
Collaboration issues – Consortium cannot agree, WP interaction not satisfactory, coordination not efficient. Possibility, as assessed at M9: *low*. *No symptoms detected.*	WP2	The project management (as described in Project Handbook; D2.1) provides appropriate decision-making and conflict resolution procedures, which will be applied. As the last instance, management of the affected organisations, including the coordinating organisation, will be involved in problem resolution. Issues considered in this risk are on "higher level" than the ones discussed in the previous risk. While symptoms of the communication risk have been observed and mitigated, no symptoms covered by this risk have been spotted.
External risks – change of project requirements due to evolution of relevant technology and market landscape.	WP2	The PC/TC/PIC/PCC will immediately analyse concrete impact on the project and propose corrective actions in the work plan. Role of Advisory Board is foreseen.

Particularly relevant due to research related to cutting-edge areas. Possibility, as assessed at M9: *low*. *No symptoms detected.* Meeting of ASSIST-IoT with its AB took place in M9 and no indication of risk from this category was raised by its members.		Proposed actions, if necessary, will be consulted with the Project Officer.
Advisory Board members are not able to conduct satisfactorily the required assessment and/or advisory roles. Possibility, as assessed at M9: *low*. *No symptoms detected.* In M9, during the initial meeting of the AB, all its members were present and were very excited about the project and actively (one could even say, enthusiastically) provided advice and offered further help.	WP2	The Consortium will monitor AB activities assuring that they are aligned with the project, implementing the adequate procedures. AB membership can be adjusted in case some AB member underperforms.

Table 3. Technical risks in ASSIST-IoT

Technical risks	**WP**	**Proposed risk mitigation measures**
The market environment or the user views change making the results obsolete. Possibility, as assessed at M9: *low*. *No symptoms detected.* Assessment based on monitoring performed continuously by the Innovation Manager.	WP3, WP9	Robust effort on market analysis in WP2 and development of an appropriate exploitation plan in WP9, including a business analysis, will assure that users' needs and wishes, as well as market trends, are constantly considered.
Detailed specification of pilots (performed in WP3) leads to realization that some goals / KPI's may be very difficult to reach. Possibility, as assessed at M9: *low*. *No symptoms detected.* Based on self-assessment performed in M8, jointly by the PC and the TC.	WP7 WP8	Analysis reaching beyond SotA (T3.1), seeking alternative solutions to be able to reach goals / KPI's. Establishing hierarchy of goals to be able to focus on realizing the most important ones (engineering 80:20 rule). Engaging Advisory Board and/or Project Officer and/or Project Reviewers to adjust the goals and KPIs in a way that will be satisfactory to all parties.
Not enough testing of technical components leading to failures, lack of functionality or dissatisfaction by users. Possibility, as assessed at M9: *low*. This risk is not yet applicable as component development, and their	WP4, WP5, WP6	Design of adequate testing plan (WP6) taking into account information gathered during design (WP3) and monitoring of technical tasks (WP4 and WP5) should result in avoiding this risk.

testing (according to project schedule) are still to be initiated.		
Problems with including/using results of machine learning / artificial intelligence in self-* mechanisms. Possibility, as assessed at M9: *low*. This risk is not yet applicable as use of ML/AI/self-* mechanisms (according to project schedule) is still to be initiated.	WP4, WP5, WP6, WP7	For one side, there will be thorough analysis of mechanisms to be implemented in the architecture and, for the other, within the ASSIST-IoT, three complex pilots with several scenarios will be implemented and thoroughly analysed to prepare a reproducible catalogue of self-* capabilities.
The selected approach of a particular plane/enabler does not fulfil the requirements of the pilots. Possibility, as assessed at M9: *low*. This risk is not yet applicable as realization of enablers within pilots (according to project schedule) are still to be initiated.	WP3, WP4, WP5, WP7, WP8	Special care must be placed on evaluation of requirements and existing solutions for each plane/enabler. A proof of concept, based on a technology, can be created if its capacity is not fully understood.
Data standardization and interoperability. Possibility, as assessed at M9: *low*. *No symptoms detected.* Project actively participates in CSA activities related to standardization. Moreover, one of members of the AB leads IEEE SAB and promised active help in standardization efforts.	WP4 WP5 WP9	A number of activities, involving data interoperability, has been envisioned within the project. Moreover, a number of activities related to various aspects of standardization have been already undertaken. Hence, due to the direct involvement in these and, hence, awareness of existing standards, potential problems related to interoperability and data standardization can be avoided.
Unable to measure or compute the KPIs as planned. Possibility, as assessed at M9: *low*. *No symptoms detected.*	WP7, WP8	Due to unexpected factors, ability to extract information and measures for pilots and the project in general, in order to compute the KPIs, can be altered, thus leading to change and adapting the planning of KPIs calculation.
Security, privacy, and trust design decisions are not aligned with the IoT market and standard trends. Possibility, as assessed at M9: *low*. *No symptoms detected.* Based on analysis performed by pertinent partners (CERTH and 21SEC) and Innovation Manager.	WP5, WP6	DevSecOps has been selected as the development methodology, in order to guarantee that security, privacy and trust are considered and in line with the market. Additionally, link with security agents will be kept as part of the impact.
Complexity of interrelations between WP4, WP5 and WP6 leads to managerial problems and negatively influences realization of action outcomes.	WP4, WP5, WP6	TC and PC are aware of the potential problems and will pay extra attention to the progress in interrelated tasks.

Possibility, as assessed at M9: *low*. *No symptoms detected.*		Potential problems related to the need of on time delivery of results to avoid bottlenecks have been discussed during the Kick-off meeting and acknowledged by all partners. Extra teleconferences (with presence of TC and, possibly, PC) are planned to mitigate effects of materialization of this risk.
Lack of interest in the project results by external stakeholders. Possibility, as assessed at M9: *low*. *No symptoms detected.* Based on responses to the result dissemination as performed within the scope of WP9.	WP9	Targeted dissemination and communication plans focused mainly on industry and academia will be provided, elaborating further the core ASSIST-IoT impact plans (D9.2), for raising external stakeholders' awareness and increasing interest in results. They will be systematically evaluated and adapted (through upcoming WP9 deliverables), to assure successful results sharing and impact.
Underperformance in the area of scientific dissemination. New risk. Possibility, as assessed at M9: *medium.* *Some symptoms have been spotted in M5-M8 and counter-measures applied.* This risk is the second one that has started to materialize. It has been spotted and is being monitored by the PC/TC and T9.2 leader.	WP9	Due to the COVID-19 a number of potential target conferences did not materialise (e.g. they were postponed or did not happen). Moreover, participation in online conferences has considerably lover impact in comparison with on-site conferences. Moreover, due to the, above mentioned, communication issues, resources have been devoted to delivery of core results, rather than dissemination-related activities. This problem has been spotted during M6 project review. Currently (M9) the situation in this area is much better and it is still possible to "catch-up" with scientific dissemination; e.g. because travel resources have been preserved due to COVID-imposed travel restrictions.

4. Conclusions

Every procedure settled in this document has been guided by highest quality considerations, from technical and management point of view, according to the ASSIST-IoT members.

Discussions that took place during the Kick-off Meeting in November 2020 and the Plenary Meeting, in early March 2021, have led to several decision that have been reported in the document.

At the moment of its submission, the deliverable D2.5 constitutes the ruling document summarising the practices related to "Risk Management" of ASSIST-IoT. This deliverable, together with the Project Handbook (D2.1) and the Consortium Agreement form the basis of interaction between partners throughout all project facets.

Reflecting on the day-to-day activities of the project (for the Risk Management Team, performing its activities under the task T2.2), this document intends to be useful and ready to be updated as many times as necessary.

The main conclusion emanating from this deliverable is the current "controlled" status of the identified risks, both administrative and technical. The risk management team is continuously monitoring the potential risks to be taking place in the project and suggesting actions in advance, for minimising their materialisation likelihood.

Appendix A - Risk Management 4-steps plan

The risk management procedure, used in the ASSIST-IoT project is summarised in the main text of this document, and consists of the following activities and steps:

- **Step 1** - Identify: search for possible risks and identify them before they become problems.
- **Step 2** - Estimate: transform each risk into information useful for decision making. This includes evaluating impact, likelihood, timeframe, classification, and priority of every risk.
- **Step 3** - Mitigate: formulate mitigation actions both for the present and the future, to prevent, reduce or eliminate negative impacts. In addition, create implementation plans for the mitigation actions.
- **Step 4** - Monitor: monitor the risk's indication and mitigation plan. If the risk, for some reason, is not mitigated correctly, according to the mitigation plan, or the risk information has changed, it is identified as a new risk and the procedure restarts from Step 1.

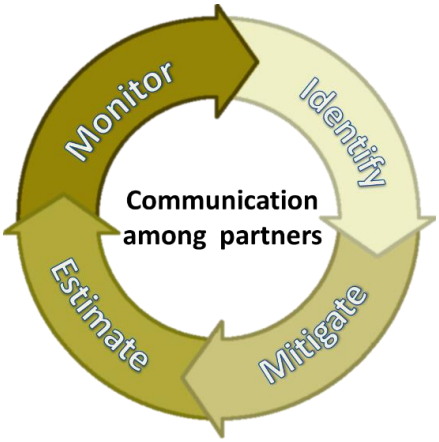

Figure 1. ASSIST-IoT Risk Management procedure

Separately, communication is fundamental aspect of all activities of risk management. Through communication, project partners provide information and feedback, both internal and external to the project, related to the risk activities, as well as identification and mitigation of current and emerging risks.

This procedure has been applied to conceptualize and deliver content of the Risk Management found in Project proposal, GA, D2.1 and in this document.