

D7.8

Risk Management Plan - updated

Author(s): Joep van den Broeke (KWR)

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Technical References

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¹ PU = Public

PP = Restricted to other programme participants (including the Commission Services)

RE = Restricted to a group specified by the consortium (including the Commission Services)

CO = Confidential, only for members of the consortium (including the Commission Services)





Document history

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1.1	14/07/2023	KWR	Addressed external reviewer comments.





Executive Summary

Risk management is the process of identification, analysis, monitoring and control of internal and external risks. The risk management process also identifies mitigation and corrective actions and their implementation, in case of risk materialization, at the earliest possible moment. To manage risks that arise during the project a Risk Management Plan (D7.4) has been prepared which defines the processes, tools and procedures that will be used to identify, manage and control risks. It also defines the roles and responsibilities of the consortium partners in the risk management processes in the project. Risk management is a continuous process throughout the lifetime of a project. This process involves the risk management chain that includes the identification, analysis, monitoring, controlling, and reporting the potential technical and management risks. The strategy also covers other issues that might affect the project progress towards its objectives, including potential mitigation actions to act as early as possible. The risk assessment process is continuous, and therefore the risk management plan is updated throughout the entire lifetime of the project.

The current document is the second (updated) version of the Risk Management Plan. The prior version of the Risk assessment established the Risk assessment process and initial risk analysis of the project until M6. Based on this version, this deliverable reiterates the processes, tools and procedures used for risk management in ULTIMATE in the period between M6 and M30. In addition, it describes the risks identified up until the time of writing and for each identified risk it details the estimated impact of the risk and the means of monitoring and mitigation through appropriate contingency planning. The risks identified up until month 30 are collected in the risk management register.

A third and last version of the risk management plan including the risk management register, will be delivered in Deliverable 7.9 in month 48 of the project.

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List of Abbreviations

- AnMBR** - Anaerobic Membrane BioReactor
- AOP** - advanced oxidation process
- CA** - corrective actions
- CoP** - Community of Practice
- CS** - Case Study
- CVGNP** - Coöperatieve Vereniging Glastuinbouw Nieuw Prinsenland
- EC** - European Commission
- ELSAR** - electro stimulated anaerobic reactor
- EU** - European union
- HT-ATES** - high temperature aquifer thermal energy storage
- IPR** - intellectual property rights
- MD** - membrane distillation
- MF** - microfiltration
- OBS** - Open Broadcaster Software
- PAB** - project advisory board
- PC** - project coordinator
- PM** - preventive measures
- PMT** - Project Management Team
- PO** - Project Officer
- PSB** - Project Steering Board
- QA** - quality assurance
- RMP** – Risk Management Plan
- RMR** - Risk Management Register
- RO** - reverse osmosis
- STC** - Scientific and Technical Committee
- SCWE** - Subcritical Water Extraction
- SOFC** - solid oxide fuel cell
- ULTIMATE** - indUstry water-utiLiTy symbiosis for a sMarter wATEr society
- UF** - ultrafiltration
- UK** - united kingdom
- UV** - Ultra Violet
- WP** - Work Package





WPL - Work Package Leader

WSIS - Water Smart Industrial Symbiosis

WW - wastewater





1. Introduction

Risk management is the process of identification, analysis, monitoring and control of internal and external risks. This process covers any other issues that might affect the project progress towards its objectives. Moreover, the risk management process also identifies mitigation and corrective actions and their implementation, in case of risk materialization, at the earliest possible moment. Risks can arise from unexpected technical and managerial issues within the project. Examples of such issues include unexpected scientific findings, poor communication or co-operation between the partners, resource shortage by partners, human operational errors, planning errors, poor quality, and incomplete tasks. As these risks can occur throughout the project, and cannot always be foreseen, risk management is a continuous process throughout the entire lifetime of a project. This Risk Management Plan outlines policies and procedures for identifying and mitigating the potential risks that can occur in the project.

It is the objective of the Risk Management Plan (RMP) to decrease the probability and impact of events adverse to the project.

In ULTIMATE (indUstry water-utiliTy symbiosis for a sMarter wATer society) 28 project partners, and 2 linked third parties, are working together over a period of 4 years to build an evidence base for industrial symbiosis based on real-world, large-scale demonstrations. The project hinges upon the case studies, located in nine different countries across Europe and Israel, in which large demonstrations of symbiosis solutions will take place.

The nine large-scale demonstration cases cover the four most important industrial sectors in Europe: Agro-food processing, Beverages, Heavy chemical / petrochemical and Biotech industry. The cases will demonstrate technologies for turning wastewater into a resource, recovery, refining and reusing wastewater, and for extracting and exploiting energy and materials contained in industrial wastewater. Figure 1 provides a schematic overview of parties involved in the industrial symbioses, Figure 2 provides a schematic representation of the processes covered by ULTIMATE.





9 SYMBIOSIS BETWEEN:

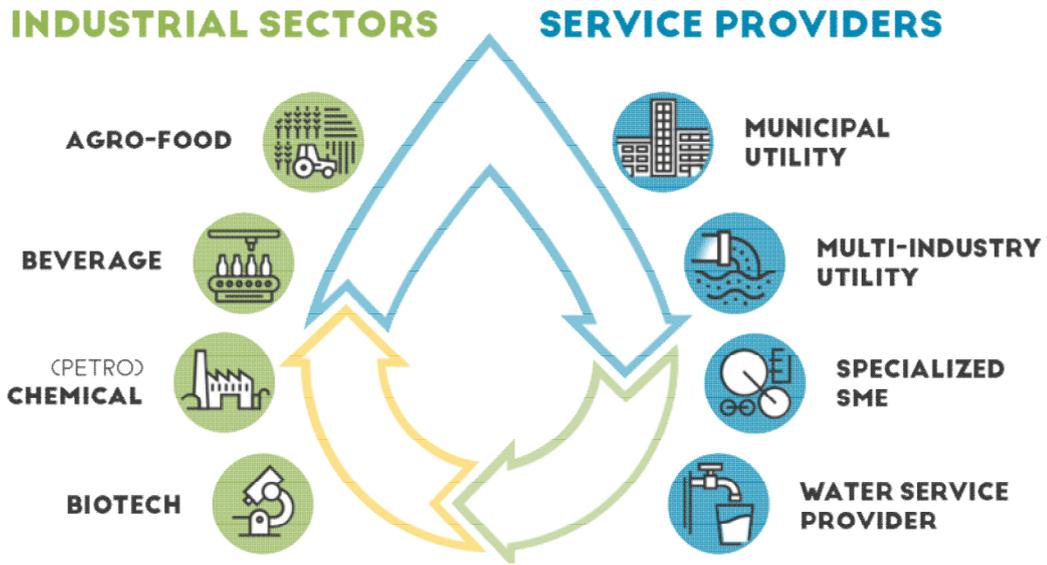


Figure 1 - Overview of ULTIMATE project main components

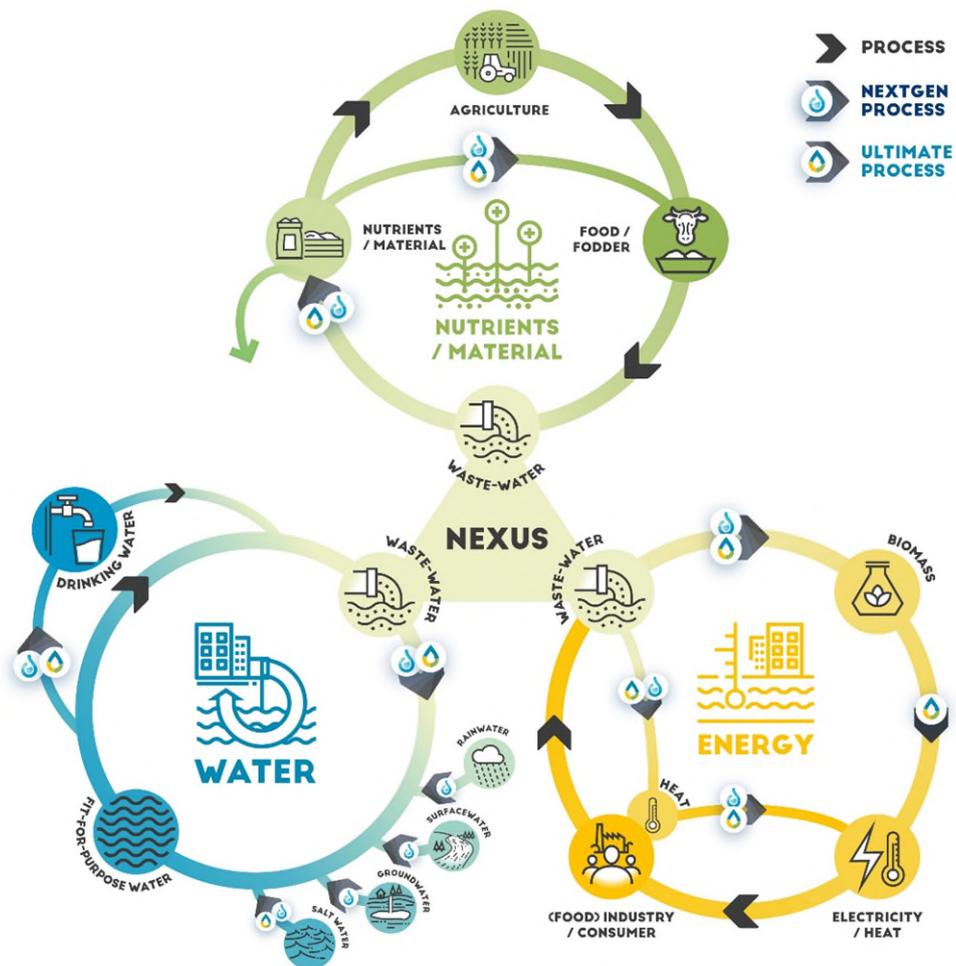


Figure 2 - Schematic overview of the processes covered by ULTIMATE





The other work packages will build upon the outcomes from the case studies and will work closely together with the case study participants as well as external stakeholders. Therefore, the project is characterised by interdependencies the different tasks and work packages. Besides project internal dependencies and the partners involved. Furthermore, ULTIMATE is positioned in the midst of society with case studies being performed in operational industrial setting and engagement of a wide range of stakeholders including citizens and businesses. Because of this, ULTIMATE activities will be influenced by legislation (European, national, regional), economic factors, pandemics, and many other external factors. Because of this complexity, an active risk management approach is essential to guarantee the successful completion of the project within the agreed framework.

To monitor and minimize the project risks, the consortium has prepared a list of risks and proposed contingency plans in the proposal elaboration (project inception phase). This list is part of the Grant Agreement (GA), and contains the major perceived risks related to the project work plan, a classification of their probability and a description of contingency measures envisaged by the consortium. This list has been complemented by information from the project partners collected during the start-up phase of project (M1 to M6). This collected information is included in this RMP. The RMP is a dynamic and continuous document that will be updated throughout the lifetime of the project. The current document provides an overview of the risks, and their status, identified and monitored by the consortium partners up to M30. A final revised version of this document will be published as Deliverable 7.9 (Risk Management Plan updated (2nd), M48).

This RMP is structured as follows: Section 2 details the Risk Management Procedure, in two main themes: Process (Section 2.1) and Roles and responsibilities (Section 2.2). Section 3 presents the Risk Management Register at the start of the project, i.e., the risks defined at the start of the project, followed by Conclusions (section 4).





2. Risk Management Procedure

2.1. Process

For the identification, monitoring and mitigation of risks, a standardised management process is defined. This process is followed throughout the project lifetime and irrespective of the nature of the risk or the level at which it affects the project (operational, executive, and strategic). Figure 3 summarises the risk management process, which is explained in more detail in this chapter.

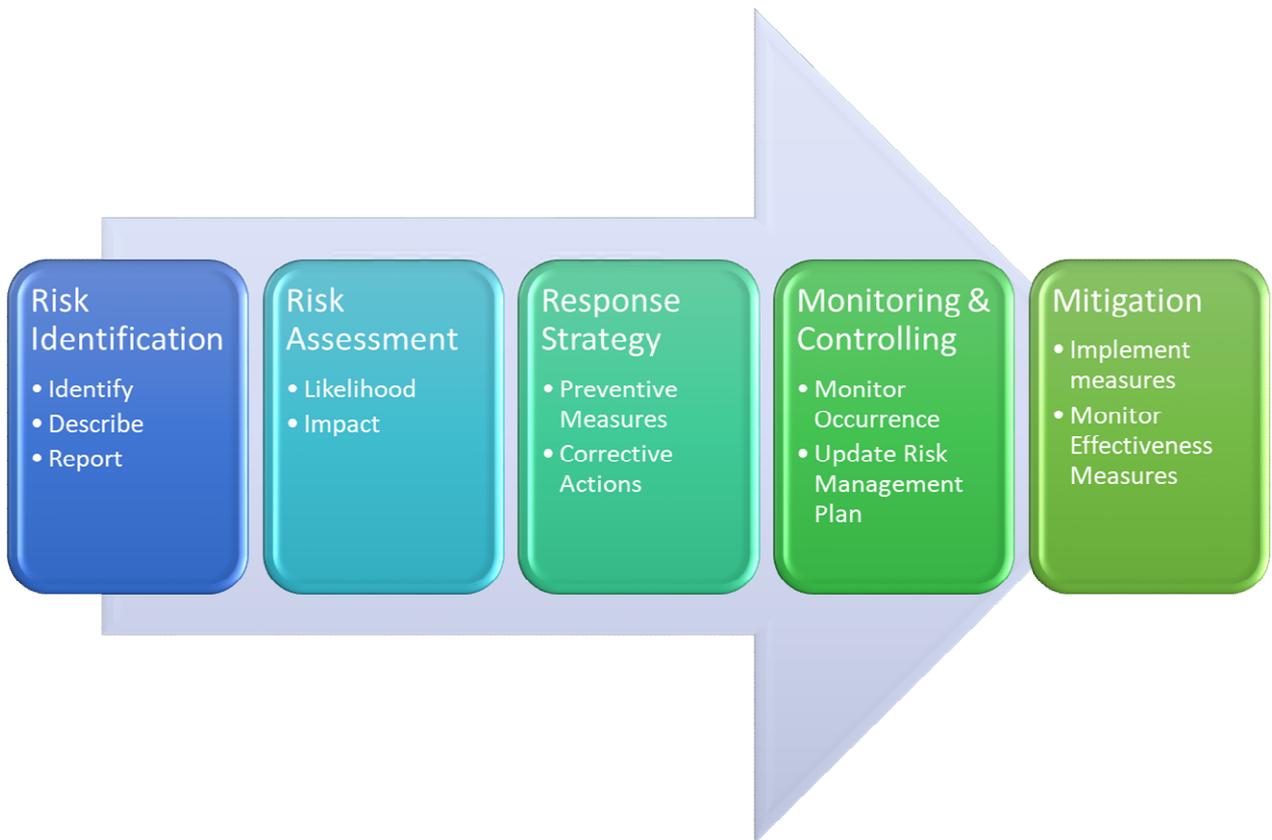


Figure 3 - Risk Management Process

The identified risks are recorded in the Risk Management Register (RMR). This register contains the following information: risk number, nature of threats, description and likelihood, WP affected and proposed risk management mitigation measures. This register will be accessible to all consortium members through the ULTIMATE SharePoint environment (\Documents\WP7\Risk Management Plan). Appendix I provides an excerpts from this register.

2.1.1. Risk Identification

The process of risk identification is a continuous process throughout the life cycle of the project. It consists of the identification of issues that might affect the project





progress towards its objectives. Once a risk is identified it will be described (nature and potential consequences) and will be reported to the work package leader of the work package concerned and/or directly to the Project Management Team and Risk Officer in case of it concerns a risk at a strategic level. The WP leader has the responsibility to report new risks identified to the Risk Officer.

The following actions will be used as tools and techniques for risk identification:

- Analysis of actual vs. planned deliverable status
- Analysis of WP schedules and scopes
- Regular communication of the WP leaders with the task leaders / case study leaders
- Regular communication of the Project Management Team with the WP leaders (monthly meetings)

2.1.2. Risk Assessment

The risk assessment step will determine the exposure to a given risk. The exposure is estimated using the risk matrix in Figure 4.

Concerning each of the risks, the Risk Officer, in collaboration with the WP leaders, will estimate the probability that the risk will materialise (Low/Medium/High) and the impact of the risk when it materialises (Low/Medium/High).

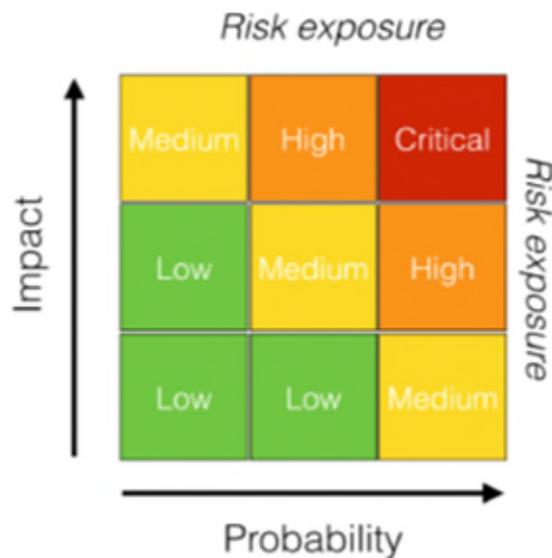


Figure 4 - Risk Matrix

Figure 4 is a standard Qualitative Risk Management Matrix, which can be found in numerous [publications](#) and [web-tools/websites](#). It has been widely in use for similar projects and project management.





2.1.3. Response Strategy

Once a risk has been identified and has been assessed, the response strategy is defined. The response strategy consists of two elements: preventive measures and corrective actions.

Preventive measures will reduce the likeness of the issue occurring. Most of the preventive measures are already defined and documented in the mentioned Risk Management Register. **Corrective actions** are measures to be taken to reduce the impact on the project in case of risk materialisation. These measures ensure a suitable strategy for achieving the proposed project objectives despite the consequences of the risk.

At this stage, the Risk Officer, in collaboration with the WP leaders and consortium partners affected, is responsible for defining preventive measures and corrective actions. Both preventive measures and corrective actions are documented/updated in the Risk Management Register.

2.1.4. Monitoring, Controlling and mitigation

The risk monitoring process is an ongoing and continuous process that will be carried out throughout the project. The identified risks, together with the risk assessment and response strategy are documented in a risk table inside the RMR. The RMR is accessible to all partners through the SharePoint project environment. The RMR forms the basis for the risk monitoring and controlling. For each risk included in the table, the following is performed:

- 1) On project partner is assigned the role of monitoring the risk (occurrence, changes in circumstances that need adjustment of risk assessment and/or response strategy).
- 2) In case a risk is identified as high or critical, it will additionally be monitored by the Risk Officer.
- 3) In case of an alteration of the risk status or level, the responsible partner should update the risk table and report this to the Risk Officer and the WP leader of the WP concerned.
- 4) In case of substantial change in the risk status or level, the Risk Officer and Project Management Team (PMT) will assess the risk and, in cooperation with the responsible partners, will define the response strategy.
- 5) In case the risk occurs, the partner informs the Risk Officer and the WP leader of the WP concerned, and mitigation measures are implemented by involved partner(s).





- 6) The WP leaders meet each month to discuss progress in the WPs including potential issues that have been identified. In case an identified issue cannot be solved in the WP leader meeting, it can be escalated to the Project Management Team (PMT) (see next bullet point).
- 7) The Project Coordinator organises monthly meetings of the PMT. In these meetings, one of the discussed aspects (included in the agenda as a separate point) relates to issues that may have arisen within a month¹. Hence, all potential issues that occur as a result of the project execution can be discussed and resolved in the mentioned meetings.
- 8) The STC and PMT may establish task forces to take the necessary actions according to the directions provided by the PSB. In case no resolution is reached, the PSB will be consulted and will establish mitigation plans to reduce the impact of the risk occurring. Responses may include increased supervision, adjustments to the project strategy, changes to implementation arrangements, and/or changes in budget allocations.
- 9) In parallel to the abovementioned aspects, the Risk Officer performs a 6-monthly review of all the risks in the RMR together with the responsible project partners.
- 10) An item can be considered closed when the following criteria are brought together: the risk-mitigation measures have been implemented and a new exposure risk is estimated as low using the Risk Matrix.

2.2. Roles and Responsibilities

2.2.1. Consortium Partners

Risk management is a responsibility of all consortium partners. Each partner has the responsibility to report immediately to their respective WP Leader (WPL) about any risky situation that may arise and may affect the project objectives or their successful completion. Any change in the time schedule of deliverables or in the allocated budget must be reported to the corresponding WP Leader. At this point, the WPL will report the Risk Officer, the project coordinator and, in case of necessity it will be informed the Project Officer (PO).

2.2.2. Work Package Leaders

The WPLs are responsible for the coordination and monitoring of the activities within their work package. Furthermore, they are responsible for synchronisation between the task leaders in their same WP and will support the PMT in co-ordination of all horizontal activities among the WPs. In this role, they are the first level of the risk management process. They are responsible for the identification and management of

¹ As detailed in the Project management handbook, the PSB meetings are organized once a month in order to monitor the project and minimize the effects of potential risk materialization.





the risks within their work package. Moreover, they have the responsibility to report new risks identified and report on changes in the situation concerning identified risks to the Risk Officer, who is a member of the PMT.

The WPL and partners in charge of the WPs are defined in the following table. In this table it is included the contact points and the PMT members:

Table 1. WPL responsibilities and contacts

WP	Partner	Contact
WP1	KWB	Anne Kleyböcker
WP2	EUT	Aitor Corchero
WP3	NTNU	Andrew Perkis
WP4	KWR	Stef Koop
WP5	STRANE	Jean-Baptiste Quintana
WP6	ESCI	Kristine Jung
WP7	KWR	Lydia Vamvakeridou-Lyroudia

2.2.3. Project Management Team

The Project Management Team (PMT) formed by the Project Coordinator and the Administrative, Innovation and IPR, Quality Control, Risk and Ethics Officers, is the organisational body responsible to the overall management of the project. As such, the PMT is responsible for the definition and implementation of the risk management process. Moreover, this team has the final responsibility for the monitoring and control of risks of all project activities. The PMT appoints a dedicated Risk Officer to lead this important activity.

In this regard, the PMT, as reported in the project management handbook, it is composed by the following members:

Table 2. PMT composition including partners and contacts

Role	Partner	Contact
Project Coordinator	KWR	Gerard van den Berg
Project co-coordinator	NTUA/KWR	Christos Makropoulos
Risk Officer	KWR	Joep van den Broeke
Administrative Officer	KWR	Bianca van der Wolf
Innovation and IPR Officer	UNIVPM	Francesco Fatone
Quality Control Officer	EUT	Andrea Naves Arnaldos and Sandra Casas
Ethics Officer	NTNU	May Thorseth
WP7 leader	KWR	Lydia Vamvakeridou-Lyroudia





2.2.4. Risk Officer

The Risk Officer is a member of the PMT and is the primary contact point concerning risk management and mitigation. The Risk Officer leads the writing and maintaining of the Risk Management Plan. Moreover, the Risk officer also coordinates the operationalisation of the risk management strategy. The Risk Officer will communicate to Project Management Board the risks and their implications to find common solutions and impact minimizations in the project execution.

In ULTIMATE, the Risk Officer (as mentioned in Table 2) is Joep van den Broeke (KWR).

2.2.5. Scientific and Technical Committee

The Scientific and Technical Committee (STC) is the executive body where the progress of the overall project is monitored and managed. The STC consists of the WP leaders and is chaired by the Project Coordinator (see Table 1 for the details about their composition).

Its main responsibility is to ensure that the scientific and technical activities of the project are accomplished successfully. The STC discusses and proposes solutions in case a risk materialises. The STC decides whether an issue can be tackled within the context of the task or work package, or whether it must be communicated to the Project Steering Board (PSB) or the European Commission (EC). In the latter cases, the STC will develop a proposal to be communicated to the PSB for decision.

2.2.6. Project Steering Board

The PSB (chaired by the coordinator) is a representative body of all the partner organisations in ULTIMATE. The PSB discusses and decides on issues related to the general progress of the project. When the resolution of an issue is not possible within the task or work package affected, and necessary mitigating measures do not fall inside the mandate of the STC, the PSB will be consulted. The PSB can decide on plans to mitigate the impact of the risk occurring. Responses may include increased supervision, adjustments to the project strategy, changes to implementation arrangements, and/or changes in budget allocations. In the unlikely event of a project objective being unachievable, it could require a removal from the Description of Activities in the interest of the project. This kind of measure should be agreed previously by the consortium and the EC Project Officer (PO).





3. Risk Management Register

The following tables list both the risk identified by the Consortium up until the signature of the agreement on the Grant Agreement (foreseen risks) and the risks identified up until M30 of the project (unforeseen risks). In addition, it presents an overview of the impact of COVID-19 restrictions and supply chain issues that have occurred since the start of the project and the delays ensuing from this developments on the progress of the Case Studies in Work Package 1.





Table 3 - Critical Implementation Risks and Mitigation Actions as included in Grant Agreement Annex 1 (foreseen risks).

Risk Number*	Description of Risk Risk Type / Risk Assessment**	WP Number	Risk Management Measures PM – preventive measures, CA – corrective actions	Date of last adjustment	Did the risk materialise	Please provide a short update of the risk: (e.g.: What has happened?, Why is it (not) relevant at the moment?, etc.)	Did you <u>apply</u> risk mitigation measures? (Yes/No)	If the risk-mitigation measures couldn't be applied/weren't applied, please explain why.
1	Project execution failure, technical problems, and delays (key milestones or deliverables delayed) <i>Risk Type: Management</i> <i>Probability/Impact: M/H</i>	WP 1 - 7	PM: PC and PMT will conduct strict monitoring of tasks against the allocated time and monitor progress closely. Milestones and deliverables with a critical path will be handled with special attention. CA: Progresses and issues will be discussed regularly within the consortium and necessary schedule adjustments will be made. In the event of technical problems and time delays, we will produce a priority list working with the Project Officer (PO) and the end-users to adjust the project to achievable timescales and objectives.	25-04-2022	WP1: For some cases delays occurred which result to missing milestones MS15, MS19 and incomplete information for deliverables D1.2 and D1.9. For details on specific risks, see table 4.	WP1: Delays between 2 and 14 months due to delays in delivery of material for the pilot plants, corona restrictions etc. Alternatively, for D1.2, laboratory experiments are presented together with the progress of the construction of the pilot plants. D1.2 will be updated every 3 months.	Yes, the CS were told to consider long delivery times. However, up to now, even though there are delays, the CS partners anticipate being capable to completely conduct their pilot tests.	
2	Limited coordination and communication among partners / WPs / tasks <i>Risk Type: Management</i>	WP 1 - 7	PM: The Coordinator and all the WP leaders have extensive experience in coordinating/ leading cooperative projects. Thus, they will ensure continuous support of project developments. Regular meetings using known communication methods will facilitate the processes.	31-10-2022	No			





			<p>CA: Effective coordination will be fostered by the proper management structure set for the project. Regular online meetings will facilitate the processes. PMT will timely intercept problems and discuss individually with concerned partners.</p>				
3	<p>Low commitment of the partners to the project plan and deadlines</p> <p><i>Risk Type: Management</i></p> <p><i>Probability/Impact: L/M</i></p>	WP 1 - 7	<p>PM: All partners of the consortium are familiar with this type of project activities. Clear responsibilities are allocated for every task in the WPs.</p> <p>CA: When needed, WP leaders directly address partners' lack of commitment. If unsuccessful, the STC will contact the relevant partner and, if necessary, re-allocate tasks and resources.</p>	31-10-2022	No		
4	<p>Administrative delays in start-up of case studies (e.g., obtaining working & building permits, site access, health and safety validation of operators)</p> <p><i>Risk Type: Management</i></p> <p><i>Probability/Impact: M/M</i></p>	WP 1	<p>PM: Project activities primarily revolve around existing facilities and/or works that are already planned. Furthermore, there is an existing close working relationship, including deployment of on-site personnel, of technical partners with the site owners (case-studies). This minimizes the administrative issues that need to be clarified. All WP1 partners are requested to report up to M6 which constraints might be relevant for the individual site and how to address them appropriately and in time.</p> <p>CA: Liaise with local partners to speed-up the administrative processes. In case of delays, the timeline and experimental planning at the demo site will adapted in a way that still ensures reaching the projects targets.</p>	24-10-2022	<p>CS5: waited 13 months for the building license for ELSAR provided by the local government of the city of Lleida (received it in Aug. 22)</p>	<p>Since the ELSAR reactor is 15m high and the brewery is located close to a small airport (Alguaire, Lleida), the building license needs to be verified by the Spanish State Air Safety Agency (AESA). The license was received 3 months later than expected at the last update of the document.</p>	<p>The licenses were requested as early as possible. CS5 will conduct lab and pilot tests in parallel to obtain hints for the optimal operation of the full-scale reactor.</p>





5	<p>Inadequate coordination of activities at case study level.</p> <p><i>Risk Type: management</i></p> <p><i>Probability/Impact: M/H</i></p>	WP 1	<p>PM: The responsible partner for the deliverables will at an early stage communicate an overview of the deliverable so that any disagreements are identified early. Local staff will be involved in day-to-day management, to keep communication lines short, and interact directly with local stakeholders not part of the consortium.</p> <p>CA: Coordination will be ensured by proper management structure, including a case study committee focussing on monitoring/management of cases, including the WP1 leader and all CS leaders. Local personnel will always be involved; regular on-site meetings will take place. Local management will report frequently to the WP coordinator to timely intercept problems.</p>	31-10-2022	No			
6	<p>Low interest from local stakeholder to participate in CoPs</p> <p><i>Risk Type: Technical</i></p> <p><i>Probability/Impact: H/M</i></p>	WP3	<p>PM: The design of the CoPs starts with an inquiry of important stakeholders, most of them already involved in the local cases.</p> <p>CA: The agenda and goals of the CoP meetings can be altered to increase the benefit for all stakeholders, including those who lost interest.</p>	27-10-2022	Yes (as well as unavailability of key stakeholders)	CoPs have been established in all CSs, and all CSs except for CS7 have held at least 1 meeting with their CoP stakeholders. At this stage in the project, understanding the project ambition and objectives (across the CSs) plays a part in the willingness to implement proposed technologies and solutions that may otherwise be unfavourable. Also not having a CoP meeting at this stage may result	No	CS7 already has its CoP stakeholders mapped out. In CS7, the 1st CoP meeting was postponed due to a reprioritisation for the designing of the demonstration system to have all necessary part to build and commission the system before 2023. The CoP meeting was then further postponed in 2022 due to the unavailability of





						in loss of interest from stakeholder and reduced trust in the CoP.		key representatives from the Glenmorangie distillery. When the CoP meeting will be held, there will likely be concrete results to share with stakeholders. If the CoP meeting will not be held early 2023, alternative approaches to the CoP will be discussed with CS7 partners to ensure the engagement with locally relevant stakeholders.
7	<p>Failure to set up the multi-use play-spaces in city close areas</p> <p><i>Risk Type: Management</i></p> <p><i>Probability/Impact: L/M</i></p>	WP3	<p>PM: The play-spaces can be moved closer to areas owned and controlled by the stakeholders in collaboration with existing Living Labs mediated through WE.</p> <p>CA: The play-spaces can be placed in easily accessible places, e.g. in reception areas or other public related areas at the stakeholder premises.</p>	31-10-2022	not yet applicable			
8	<p>Loss of key staff</p> <p><i>Risk Type: Management</i></p>	WP 1 - 7	<p>PM: There is no critical task that is dependent on a specific individual. It will be policy to spread knowledge throughout the team.</p>	31-10-2022	No			





	Probability/Impact: M/L		<p>CA: Most of the partners are large organisations and will be able to replace staff as needed. If necessary, tasks will be re-assigned by the STC.</p>				
9	<p>Loss of key partner</p> <p>Risk Type: Management</p> <p>Probability/Impact: L/H</p>	WP 1 - 7	<p>PM: Effective management procedures to timely intercept problems, and/or reallocate partners. The consortium agreement will govern the policies behind.</p> <p>CA: If needed, replace with new partners with suitable skills and profiles in collaboration with the PO. In the eventuality that the exit of the partner will mean a case study cannot be performed successfully, the PMT together with the STC and PAB will look proactively for another case in the same region and of a similar nature using our networks and present alternatives to the PO for decision making.</p>	31-10-2022	No		
10	<p>The UK leaves the EU without a deal</p> <p>Risk Type: Management</p> <p>Probability/Impact: H/H</p>	WP 1, 2, 4	<p>PM: There is no prevention measure for this event. It is beyond the control of the consortium. ULTIMATE, however, is being submitted before the deadline on withdrawal from the EU (October 31, 2019). UK partners are not leading any WP, to minimise potential risks to the management of the project.</p> <p>CA: The UK has pledged to fund UK partners submitting proposals before Brexit, if these are successfully evaluated. In this event, the UK partners would effectively be self-funding using UK funds. Project budget will be adapted according to the (forthcoming) instructions from the Commission pertaining to the</p>	26-2-2021	No	EU and UK reached a deal on Brexit.	





			budgets of UK partners in consultation with the PO.					
11	The UK leaves the EU with a deal <i>Risk Type: Management</i> <i>Probability/Impact: L/L</i>	WP 1, 2, 4	PM: There is no prevention measure for this event. It is beyond the control of the consortium. CA: The Withdrawal Agreement makes provision for UK partners to continue to be funded under the Horizon 2020 programme in the normal way.	26-2-2021	Yes	Consortium agreement in effect, UK partners can continue to work as foreseen on the project	No	No prevention measures possible, beyond control of the consortium
12	Disputes over the ownership of IPR among partners <i>Risk Type: management</i> <i>Probability/Impact: L/M</i>	WP 7	PM: IPR and access right clauses will be integrated in the consortium agreement (DESCA based). The documents will be signed before the start to avoid potential disputes. CA: Legal procedures will be followed, but the PMT will try to resolve the matter first internally with help from the EAB.	31-10-2022	No			
13	Lack of consensus on scientific or technological approach <i>Risk Type: Management</i> <i>Probability/Impact: L/H</i>	WP 1 - 6	PM: The responsible partner for the deliverables will at an early stage communicate an overview of the deliverable so that any disagreements are identified early. Diverse and highly expert PAB members have been selected from the start, to act as advisors. CA: Discuss and agree on a common standing in the STC, and seek input from the PAB, as external advisors. If necessary other specific experts will be sought and added to the PAB.	31-10-2022	No			
14	Unacceptable quality of results	WP 1 - 7	PM: The reviewing process for all project deliverables and reports, plus the	31-10-2022	No			





			<p>contribution of the PAB, will ensure the acceptability of project results.</p> <p>CA: The STC (with the QA Officer) decides on corrective measures to be taken to improve the quality of results, and if necessary, to re-allocate this responsibility to another partner.</p>				
	<p><i>Risk Type: technical</i></p> <p><i>Probability/Impact: L/M</i></p>						
15	<p>The solutions developed are too case specific</p> <p><i>Risk Type: technical</i></p> <p><i>Probability/Impact: L/M</i></p>	<p>WP 1, 3, 6</p>	<p>PM: The variety of end users, country, and domain wise (WP1), and the CoPs cross-fertilisation (WP3), will ensure a wide view and adoption of the proposed innovations.</p> <p>CA: <i>ULTIMATE</i> will consider, and connect to, existing EU and International generated knowledge and initiatives (WP6).</p>	<p>31-10-2022</p>	<p>No</p>		
16	<p>Data from Cases are sparse and are not enough to apply all methods and tools</p> <p><i>Risk Type: technical</i></p> <p><i>Probability/Impact: M/M</i></p>	<p>WP 1, 2</p>	<p>PM: The preparation for the description of the Demo Cases has been done with active participation and consent of the partners involved. Parties involved at each case have been collaborating for years and know each other and the status of the existing infrastructure. Furthermore, WP2 is designed to allow different tools to be applied to different cases. The tools are flexible to work with as much data as available and key cases where we know a lot of data exist are identified to demonstrate the tools.</p> <p>CA: If a case has less data than we need to provide even basic assessments, we will target data collection there, in collaboration with the CoPs and if needed shift resources in WP2 and WP7 (project management) to solve the problem.</p>	<p>31-10-2022</p>	<p>No</p>	<p>Small delays are on acquiring CS data.</p>	<p>The corrective action is focused on continuing the development with synthetic data and advance on the WP2 tools</p>





17	<p>There is less interest than anticipated in uptake of the <i>ULTIMATE</i> products and tools</p> <p><i>Risk Type: dissemination and exploitation</i></p> <p><i>Probability/Impact: M/M</i></p>	<p>WP 2, 5, 6</p>	<p>PM: The tools will be housed with the CE Marketplace originally developed by NextGen which guarantees a large and diverse end-user membership as part of WE's infrastructure.</p> <p>CA: As part of WP5 and WP6 we will target relevant audiences and pro-actively demonstrate the solutions and tools – and modify based on feedback if needed to enhance uptake.</p>	<p>31-10-2022</p>	<p>No</p>			
18	<p>Stakeholders outside the project are not interested</p> <p><i>Risk Type: dissemination and exploitation</i></p> <p><i>Probability/Impact: M/L</i></p>	<p>WP 1 - 6</p>	<p>PM: Stakeholders will be contacted early in the project to participate in CoPs (WP3). Various communication activities to raise interest are foreseen in WP6. The PAB consists of internationally renowned leaders in the area, who will act as ambassadors.</p> <p>CA: Communication tailored to target audience to gain (renewed) interest, working bottom up with key audience members (e.g., engage our links to local authorities, leveraging e.g. Global City networks such as the 100 Resilient Cities).</p>	<p>31-10-2022</p>	<p>No</p>			
19	<p>Market demand for the project outcomes is lower than expected</p> <p><i>Risk Type: Dissemination and exploitation</i></p>	<p>WP 5</p>	<p>PM: We will specifically initiate market uptake activities and target reasons for delay or barriers to implementation in several WPs (e.g., WP3, 4 and 5) to identify specific ways forward to the market (see WP5 description).</p>	<p>31-10-2022</p>	<p>No</p>			





			<p>CA: Reasons for low interest in specific innovations will be analysed in the CoPs (WP3) and assessed in terms of legal barriers (WP4) and business perceptions (WP5). We will focus more on those solutions that are taking off much faster than the others</p>				
20	<p>Limited visibility of the project</p> <p><i>Risk Type: dissemination and exploitation</i></p> <p>Probability/Impact: L/M</p>	WP 6	<p>PM: WP6, led by an experienced partner (ESCI) is dedicated to ensuring effective communication, dissemination, and outreach of the project towards targeted stakeholders. The consortium has an extensive network of contacts and connections that can increase the visibility of the project. Of particular note is partner WE, the recognized voice and promotor of water related Research and Innovation in Europe.</p> <p>CA: The Plans for the Exploitation and Dissemination of Results (see WP5-6) will be monitored and regularly updated. Moreover, it will also consider adapting activities if necessary. The communication strategy deployment will make sure ULTIMATE is visible online and during expert/international events. In case of low interest, additional, targeted communication channels will be used.</p>	31-10-2022	No		
21	<p>Policy recommendations not incorporated</p> <p><i>Risk Type: dissemination and exploitation</i></p>	WP4, WP6	<p>PM: Insights into supportive governance arrangements and the related policy recommendations will be brought into our extensive network of decision-makers considering policy and industry organisations through interactive meetings.</p>	31-10-2022	No		





			<p>CA: <i>ULTIMATE</i> cannot impose policy recommendations to regulatory organisations, but by managing it as an ongoing relationship, a step-by-step approach will be envisioned.</p>				
22	<p>Insufficient access to horticultural facilities, in particular drain water from greenhouses, and data on water quality and water & energy consumption</p> <p><i>Risk Type: management</i></p> <p><i>Probability/Impact: L/H</i></p>	<p>WP1, WP2</p>	<p>PM: CVGNP, in a letter of commitment, has indicated it will support the project by providing this access.</p> <p>CA: KWR has relations with other horticulture organisations in the Netherlands, e.g., through its collaborative work in H2020 projects SUBSOL and NEXTGEN, as well as national projects. KWR will timely connect with this existing network to obtain the required water and information in case this risk materialises.</p>	<p>26-02-2021</p>	<p>No</p>	<p>A second location has been found, and a collaboration agreement with this location is in place. Work on water and material reuse/recovery will take place at this location. For work on energy component an alternative solution in combination with geothermal heat supply to greenhouses in Westland region has been found.</p>	
23	<p>Access to demo-greenhouse, required to perform plant-studies, is not available.</p>	<p>WP1</p>	<p>PM: The work in the demo-greenhouse was planned to be performed at a service provider with such facilities, and not on-site at CVGNP facilities. The connection with a specialised service provider has been established, and associated costs included in the proposal. No risk ensues from withdrawal of CVGNP.</p>	<p>31-10-2022</p>	<p>No</p>	<p>PM in place and contact with this service provider established (quotation for work to be performed has been obtained).</p>	





			<p>CA: Capacity in demo-greenhouses needs to be planned well in advance – as business is strongly aligned with the growing seasons of crops. Timely contact will be established with the specialised service provider to ensure the needed capacity is available when needed in ULTIMATE. In case of insufficient capacity being available in the foreseen months for this activity, the plant growth experiments, foreseen for year 1 – 2, can be moved backwards by 1 year. This will allow sufficient time for planning at the specialised service provider ensuring the required capacity is available. This will not affect other activities in WP1, as this is a stand-alone activity, with no connected activities in subtasks.</p>				
	<i>Risk Type: management</i>						
	<i>Probability/Impact: L/H</i>						
24	Difficulty to access stakeholders in the agriculture, specifically horticulture, sector	WP3	<p>PM: CVGNP, in a letter of commitment, has indicated it will support the project by supporting KWR in its interaction with relevant stakeholders.</p> <p>CA: KWR has relations with other horticulture organisations in the Netherlands, e.g., through its collaborative work in H2020 projects SUBSOL and NEXTGEN, as well as national projects, KWR will timely connect with this existing network to establish access to relevant stakeholders.</p>	31-10-2022	No		
	<i>Risk Type: Management</i>						
	<i>Probability/Impact: L/M</i>						
25	Difficulty in communicating with stakeholders online and getting additional	WP3	<p>PM: proactively decide on the technology that will be used and implemented to implement the narrative</p>	31-10-2022	No		





<p>information needed to iterate prototyping of the immersive art installation / experience.</p> <p><i>Risk Type: Management</i> <i>Probability/Impact: L/M</i></p>		<p>experiences that the stakeholders ideated. This will not be an optimal way to co-create ideas and solutions but will fast track the prototyping process. Which we can later show to the stakeholders for feedback and potential improvement of solutions.</p>					
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*: the colour indicates the risk category, the colours referring to the Risk Matrix in Figure 2.

**: L/M/H – low, medium, high

Table 4: Critical Implementation Risks and Mitigation Actions identified since M1 of the project (unforeseen risks).

Risk Number*	Description of Risk Risk Type / Risk Assessment**	WP Number	Risk Management Measures PM – preventive measures, CA – corrective actions	Date of last adjustment	Did the risk materialise	Please provide a short update of the risk: (e.g.: What has happened? , Why is it (not) relevant at the moment?, etc.)	Did you <u>apply</u> risk mitigation measures? (Yes/No)	If the risk-mitigation measures couldn't be applied/weren't applied, please explain why.
U1	The impacts of the COVID-19 pandemic continue to expand. This can impact the project lifecycle in terms of reduced capacity of the project to implement actions and timely produce some of the deliverables. Budget allocated to tasks might also be impacted becoming either insufficient or excessive against the change of the action plan due to the	WP 1 - 7	PM: Considering that travel is difficult in Europe (October 2020) and quarantines are imposed from member states, resorting to online tools and activities replacing the planned activity in presence might not meet the expectations concerning the intensity of the interaction and cooperation between project's partners and stakeholders. Some related outcomes require more time or develop alternative action plans. Budget allocated to tasks might also be impacted becoming either insufficient or	24-10-2022	Yes, it will materialise very likely for WP1	WP1: most of the CS have delays due to delays in the delivery time of material due to the pandemic situation. Also, the prices for pilot plant elements increased significantly -> re-design of the construction to remain in the budget frame	Yes, we told the CS to consider long delivery times. However, the CSs anticipate completing their pilot tests. They extend the lab tests to learn more and accelerate the start-up and optimisation phase of the pilots.	





	<p>implementation COVID-19 restrictions and constraints.</p> <p><i>Risk Type: Management</i></p> <p><i>Probability/Impact: H/M</i></p>	<p>excessive against the change of the action plan due to the implementation COVID-19 restrictions and constraints.</p> <p>CA:</p> <ul style="list-style-type: none"> flexibility will be given in relation to the action implementation in coordination with the project coordinator and the partners of the affected tasks: Whenever possible, we will use to telework or other forms of remote working. Tasks where physical presence is needed on the ground will be postponed after confinement/restriction measures are over. In the meantime, ULTIMATE will promote and perform remote work. Planning will be adjusted accordingly. The EC stated that costs will still be eligible for the work carried out under the action even if such shifting entails deviations from the initial timing set out in Annex 1. 			<p>This impacts D1.2 for some of the case studies. However, in most CS at least some parts of their technical solutions will be operational for D1.2.</p>		
<p>U2</p>	<p>Delays in the actions of WP1 related the COVID-19 restrictions.</p> <p>Risk Type: Management</p> <p>Probability/Impact: H/M</p>	<p>WP 1 – all case studies</p> <p>PM: The risks are monitored by the Case Study leaders and reported in the living documents describing their current status. The living documents are stored and continuously updated in the WP1 folder of the SharePoint domain.</p> <p>CA: Every 3 months, the delays and the contingency plans are monitored. In the case of delays, the timeline and experimental planning will be adapted to still achieve successfully the project goals. This will be presented and discussed with the PMTs.</p>	<p>24-10-2022</p>	<p>yes, see table 5 "COVID-19 associated delays"</p>	<p>see table 5 "COVID-19 associated delays"</p>		





U3	<p>It might not be possible to realise all elements of the ZLD pilot plant in time for MS15 (M18). The definition of the operation mode of the brine treatment scheme might not be totally finalized at bench scale and thus, operation scheme of MD can still be pending.</p> <p>Risk Type: Technical</p> <p>Probability/Impact: H/L</p>	WP 1 – case study 1	<p>CA: the core part of the pilot plant (pre-treatment (UF/MF) + Advanced Reversed Osmosis and zeolites) will be operational in time for MS15 (M18), and additional features (Membrane distillation) will be added in time for D1.2 (M24).</p>	24-10-2022	yes, it will; MS15 won't be reached before M24	see table 5 "COVID-19 associated delays"		
U4	<p>Access to the CVGNP facilities and their contribution to WP1/WP3 will be very limited.</p> <p>Risk Type: Management</p> <p>Probability/Impact: H/L</p>	WP 1	<p>CA: Finding an additional partner who can take over the contribution of the cooperative in WP1 and WP3.</p>	25-6-2021	yes, but an alternative has been found			
U5	<p>The project to construct the residual heat pipeline to CVGNP has been cancelled. A pilot HT-ATES at the location, without a heat source, is therefore not meaningful.</p> <p>Risk Type: Management</p> <p>Probability/Impact: H/M</p>	WP1 – case study 2	<p>CA: ULTIMATE will find an alternative location for performing the HT-ATES related work.</p>	25-6-2021	yes, but an alternative has been found			





U6	<p>The components of the Subcritical Water Extraction (SCWE) system cannot be acquired before the second round of financing. There is a risk this round of funding will not be out in time for the pilot facility to be completed in time for D1.2 (M24).</p> <p>Risk Type: Management</p> <p>Probability/Impact: H/L</p>	WP3	<p>CA: The extraction will first be demonstrated in lab scale using alternative techniques such as pressurized hot water (as in CS6) and organic solvents for the purpose of showing the principle. As soon as the SCWE components are acquired and the system assembled and tested, the pilot unit will be finalized.</p>	24-10-2022	<p>The pilot units are expected to be operational for CS4 in M24 and for CS6 in M30 (lab scale results will be available for MS15 & D1.2)</p>	see table 5 "COVID-19 associated delays"		
U7	<p>2nd batch of pre-financing is required before the pilot facility to be provided by GtG can be completed. There is a risk this round of funding is not available in time to allow for completion of this part of the pilot in Case Study 6 for completion of D1.2 in time (M24).</p> <p>Risk Type: Management</p> <p>Probability/Impact: H/L</p>	WP1 – case study 4	<p>CA: the pilot site will be operational in time for D1.2 (M24), but the GtG component will be added as soon as possible after the D1.2 deadline.</p>	24-10-2022	Yes, will happen	see table 5 "COVID-19 associated delays"		
U8	<p>Low performance and accuracy of the simulation and optimization models</p> <p>Risk Type: Technical</p> <p>Probability/Impact: L/M</p>	WP1, WP2, WP3	<p>PM: In ULTIMATE, the selected data-driven models, modelling algorithms, simulation algorithms will be benchmarked and assessed considering the case-studies information, needs and requirements.</p> <p>CA: If a case of low performance and accuracy of the algorithms, ULTIMATE will analyse the problem case-by case and, will provide a combination of different AI modelling and design to</p>	31-10-2022	No			





			acquire desirable performance and accurate rates.					
U9	Delays in the deployment of the ICT solutions. Risk Type: Technical Probability/Impact: L/L	WP 1 - 7	<p>PM: In ULTIMATE, the development, testing and deployment of ICT technologies will be defined under a Continuous Integration methodology. Thus, the proposed development and deployments will be automated and configured since the beginning. Therefore, the timely deployment of the solutions for their demonstrations is facilitated.</p> <p>CA: In case of difficulties to provisioning of servers in specific partners of ULTIMATE (to be decided which partner will be responsible of deployments), cloud services will be used (e.g., Amazon Web Services) accomplishing EC recommendations of hosting the information in European cloud servers.</p>	31-10-2022	No			
U10	The implications of travel and meeting restrictions due to COVID-19 will impact the start-up and running of various activities in WP3. Wide collaboration in development of the playbook in Task 3.1 would require physical meetings with stakeholders and lab/field visits especially for case studies, which is not possible.	WP 1, 2, 4	<p>CA D3.1: Online collaboration between NTNU and WE for finalizing the Deliverable on time.</p> <p>CA D3.3: Due to COVID-19, we cannot meet the key players in WP3 for detailed collaboration in the development of the playbook. The quality of the playbook is decreased due to the lack of visits and personnel engagement of the chosen case study locations. To allow for sufficient quality, the proposed solution will be followed:</p>	27.10.2022	Partially	The intermediate D3.3 will include Playbooks for Understand and Imagine. The remaining 3 will be reported in D3.3 version 2 (M27). The results of the co-creation will be reported in D3.5.	Yes	





	<p>Risk Type: Technical</p> <p>Probability/Impact: H/M</p>	<p>D3.3 intermediate version M18 (as planned)</p> <p>An intermediate version of D3.3 will be delivered as planned. This deliverable will contain the framework of the ULTIMATE Playbooks, the selection criteria for choosing the 3 use cases to be implemented and initial play books for each of them.</p> <p>D3.3 final M27</p> <p>An updated and revised version will be delivered in M27 with updates from the physical places of the 3 selected use cases to be implemented. Moreover, it will include the final Play books with the detailed Place by design elements.</p> <p>By having an update and revision of D3.3 in M27 we will have an overlap between T3.1 and T3.3 by 4 months to be able to catch any changes or required revision thus ensuring high quality and on time delivery of D3.6</p>					
<p>U11</p>	<p>The implications of travel and meeting restrictions due to COVID-19 will impact the start-up and running of various activities in WP3. The work on communities of practice in Task 3.2.1 will be less effective if physical meetings with stakeholders are not possible.</p> <p>Risk Type: Technical</p> <p>Probability/Impact: H/M</p>	<p>WP3 – task 3.2.1</p> <p>CA D3.5:</p> <p>All CoPs can be conducted on-line. KWR is developing new capacity to work with different tools for on-line engagement and co-creation. We will share this experience and the tools with case studies in the guidance for CoPs that we are developing. We expect a first draft of the guidance to be shared with WP3 lead by M5 and to be ready for sharing with case studies in M7.</p> <p>Also, KWR can train CoP coordinators and moderators to the use of the tools. However, KWR cannot train multiple moderators for 9 case studies over 4 years due to the amount of required effort. It would be important that each case study has one designated CoP</p>	<p>27-10-2022</p>	<p>Partially</p>	<p>All CoPs moderators and other supporting people have been trained on how to host online meetings and how to host their 1st CoP meetings. Some of the CoPs were delayed and waited longer than anticipated to host their first meetings due to COVID, as they wanted to host them in person. CoPs have been hosted online and in person, and results of these two types of meetings will</p>	<p>Yes</p>	





			<p>moderator who remains the same for the whole project. This person needs to have "people skills", i.e., need to have interest, capacity and possibly already experience with stakeholder co-creation and learning. This person, ideally, could also be the same that conducts (as needed) interviews, and other interaction activities with CoP stakeholders.</p> <p>KWR will organize a one-time training of CoP moderators within M6. If case studies have not identified, they can select one/two selected people to join the training and these people will then internally train the CoP moderators as needed.</p>			be investigated to ensure improvements in future CoP meetings.		
U12	<p>The implications of travel and meeting restrictions due to COVID-19 will impact the start-up and running of various activities in WP3. The work on B2B engagement will be less effective virtually rather than physical meetings with stakeholders were not possible.</p> <p>Risk Type: Technical</p> <p>Probability/Impact: H/M</p>	WP 7	<p>D3.4 Co-creation requires some form of social communication and creating empathy with people involved in the process of collaboration and "making/doing" that enables other participants to a shared solution. Some co-creation exercises can be done online but some that involves "design thinking" that focuses on human beings, on creating empathy with people, reframing challenges in a way that enables people, stakeholders to contribute to a unified solution is simply very challenging, unproven, and maybe ineffective in an online scenario.</p> <p>CA:</p> <ul style="list-style-type: none"> - NTNU to design a playbook for facilitators and organise trainings of stakeholder / co-creation moderators. - NTNU to design a playbook for online training of co-creators requires more effort than preparing a training presentation. 	31.10.2022	No			





			These tasks require important dedicated time and preparation to ensure unity in results, training of co-creation moderators in "design thinking", empathy, and prototyping approach. Moreover, it requires several full days with group and field work trainings (out of the box perhaps from their own environment).					
U13	<p>The implications of travel and meeting restrictions due to COVID-19 will impact the execution of various activities in WP4. Focus groups with the public (i.e., with visitors to the demonstration sites) aren't possible since the sites are closed to the general public, and physical meetings are not allowed. Face-to-face interviews with key informants and key industries to examine the societal expectations and discuss (the evolution and upscaling of) WSIS aren't possible.</p> <p>Risk Type: Technical</p> <p>Probability/Impact: H/M</p>	WP4 – task 4.1	<p>CA: Instead of focus groups with visitors, UCRAN and KWR will conduct a number of follow-up interviews with T4.1 survey respondents (i.e. members of the general public) in which the basic CE structure of the site will be introduced, and hereafter discussed.</p> <p>The foreseen face-to-face interviews with key informants and key industries will be conducted online.</p>	31-10-2022	No			
U14	<p>The implications of travel and meeting restrictions due to COVID-19 will impact the execution of various activities in WP4. The work on communities of practice (Subtask 4.2.2, in collaboration with Task</p>	WP 1 - 7	<p>CA: As elaborated on in U11, all CoPs can be conducted on-line. KWR is developing new capacity to work with different tools for on-line engagement and co-creation</p>	31-10-2022	No			





	<p>3.2.1) will be less effective when using virtually rather than physical meetings with stakeholders. Face-to-face interviews to discuss governance challenges and means to overcome these challenges aren't possible.</p> <p>Risk Type: Technical</p> <p>Probability/Impact: H/M</p>		<p>The foreseen face-to-face interviews with key informants and key industries will be conducted online.</p>					
<p>U15</p>	<p>The implications of travel and meeting restrictions due to COVID-19 will impact the execution of various activities in WP6. No personal interview, face-to-face meetings or big conferences can take place. The ensuing risk is weak stakeholder engagement (connected to risk U12) and limited opportunities to communicate and disseminate results.</p> <p>Risk Type: Management</p> <p>Probability/Impact: H/M</p>	<p>WP 1, 3, 6</p>	<p>CA The following corrective actions are being undertaken to collect the required input for communication materials:</p> <ul style="list-style-type: none"> - video recording via OBS, but the resulting quality is not the same as filming on location would be. - instead of visits to the case studies to produce film and photo footage, the partners are requested to share materials from their archive/produce materials themselves - Use of digital meetings to replace face-to-face meetings and seminars/conferences. However, an event booth for promoting the project is not possible in such cases, nor is distribution of material or creating additional film footage for producing the inspiring video profiles. 	<p>31-10-2022</p>	<p>No</p>			





<p>U16</p>	<p>The exploitation strategy might be impacted by the global economic crisis (company bankruptcy, budget/investment limitations) as the result of the COVID-19 pandemic.</p> <p>Risk type: Dissemination and exploitation</p> <p>Probability/Impact: M/M</p>	<p>WP 5</p>	<p>PM: We will contact as much potential clients as we could during the timing of the project and identify the ones are willing to develop their investments in the near future.</p> <p>CA: The market status and evolution post COVID-19 will be thoroughly analysed in the different European countries to map the best opportunities of exploitation and commercial development.</p>	<p>31-10-2022</p>	<p>No</p>	<p>There has been a brief market literature review corresponding to most ULTIMATE results and there doesn't seem to be an important market change for commodities or needs related to the KERs. More information will become available as the exploitation activities continue.</p>		
<p>U17</p>	<p>The pilot unit for the reclamation of the greenhouse drain water and for the recovery of nutrients won't be operational until M18 (MS15) and M24 (D1.2)</p> <p>Risk Type: Technical/Management</p> <p>Probability/Impact: H/M</p>	<p>WP 1 - CS2</p>	<p>CA: For MS15 and D1.2, results from the laboratory experiments will be shown and the progress of the pilot plant construction.</p>	<p>31-10-2022</p>	<p>The pilot unit is expected to be operational in M30 (results from lab scale experiments will be available until M24)</p>	<p>see table 5 "WP1 CS details"</p>		
<p>U18</p>	<p>The industrial scale unit for sulphur recovery won't be operational until M18 (MS15) and M24 (D1.2)</p> <p>Risk Type: Technical/Management</p> <p>Probability/Impact: H/M</p>	<p>WP 1 – CS5</p>	<p>CA: For MS15 and D1.2, results from the laboratory pilot plant will be shown</p>	<p>31-10-2022</p>	<p>The industrial scale unit is expected to be operational in M30 (results from lab scale experiments will be available until M24)</p>	<p>see table 5 "WP1 CS details"</p>		
<p>U19</p>	<p>The ELSAR unit won't be operational until M18 (MS15) and M24 (D1.2)</p>	<p>WP1 - CS5</p>	<p>CA: For MS15 and D1.2, the water system (post-treatment for water reuse: UF&RO) will be operational in time. The AnMBR,</p>	<p>31-10-2022</p>	<p>The AnMBR, ELSAR and AOP&UV units</p>	<p>see table 5 "COVID-19 associated delays"</p>		





	Risk Type: Technical/Management Probability/Impact: H/M		EL SAR and AOP&UV will follow in M23. Due to an upscaling of the system, the reactor design and construction needs more engineering work than originally planned for the smaller system and special building licences, because the height of the reactor will be 15 m.		are expected to be operational in M23			
U20	Case Studies suffer delays due to the pandemic and are not able to provide concrete results for exploitation activities.	WP5	PM: WP5 will make a selection of technologies demonstrated in WP1 to focus on for the exploitation activities. A limited number of candidates will be selected from a longlist of technologies. In case one or more technologies do not advance to a stage where exploitation can be investigated, the longlist will be shorter. However, there will remain sufficient technologies that reach a TRL suitable for the exploitation activities in ULTIMATE.	31-10-2022	No			
U21	The RO, heat recovery and ammonia recovery units won't be operational until M18 (MS15) and M24 (D1.2) Risk Type: Technical/Management Probability/Impact: H/M	WP1, CS7	CA: For MS15 and D1.2, the systems will be operational in M23. There is a risk due to long delivery times, that parts of the systems won't arrive in time and a further delay will occur.	22-11-2021	Pilot systems are expected to be operational in M23			
U22	SUEZ is involved in a merger with Veolia. Potentially SUEZ IWS (all or part of it) will join Veolia and 3S will remain outside of the new Veolia organisation. The collaboration between the partners needs to be approved by both parties. The merger process is	WP1, CS8	PM: work at lab scale in CS8 at SUEZ IWS continues independently of 3S.	31-10-2022	Yes	The relationship between IWS and 3S is effectively in stand-by. 3S would like the situation to be clarified before installing its software on our plant (if we become competitors). The European Commission		





	<p>currently ongoing. Delays may occur if approval to continue the collaboration is delayed.</p> <p>Risk Type: management</p> <p>Probability/Impact: H/H</p>					<p>approved the acquisition of Suez by Veolia, subject to conditions. In particular, the divestment of part of Veolia's and Suez's hazardous waste landfill activities and all Suez's activities in the incineration and physical-chemical treatment of hazardous waste. A part of IWS is concerned by this measure. It seems that 3S and IWS will be part of two different companies.</p>		
U23	<p>Low uptake of the innovations demonstrated in ULTIMATE by the case studies</p> <p>Risk Type: management</p> <p>Probability/Impact: M/M</p>	<p>WP1, Strategic Objective #2</p>	<p>PM: The industrial stakeholders (end-users) are engaged in the activities, either as project partners or as stakeholders in the CoPs. This ensures they are engaged in the project, their interests and requirements are incorporated in the innovation development and demonstration.</p> <p>CA: Not all innovations may achieve the performance expected. Not all innovations will reach TRL 9 at the end of the project. Therefore, not all innovations will be adopted by the case studies until the end of the project. This leads to a risk to strategic objective 2 – with regards to reduction of fresh water use, energy use and material recovery achieved.</p>	31-10-2022	<p>No, too early in the project to evaluate, outcomes from pilots and demonstrations are not yet available.</p>			





			In such caes, the lessons learned will be summarised in guidelines for further development, which will guide technology developers in developing their innovations to a mature product.					
U24	Insufficient interest in the replication studies Risk Type: management Probability/Impact: L/M	WP5, T5.6	<p>PM: an open call will be published to advertise the replication studies offered by ULTIMATE. The replication studies are offered as a greenfield assessment, focussing on assisting sites in identification of overall WSIS potential (thus furthering the sustainable industry policy of the EC as a primary objective), while at the same time exploring potential for application of specific innovations developed in ULTIMATE (as secondary objective). Wide publication, through Water Europe, social media channels, ULTIMATE website and distribution to direct contacts of ULTIMATE partners, should ensure sufficient response to the call. Focussing on WSIS concepts as primary objective ensures a wider eligibility of sites for the assessment.</p> <p>CA: In case insufficient responses are received, the open call will be extended and published though additional channels (e.g. industry branch organisations and specialist journals).</p>	31-10-2022	No, open call to be published in December 2022			

*: the colour indicates the risk category, the colours referring to the Risk Matrix in Figure 4.

** : L/M/H – low, medium, high





Table 5: Delays due to COVID-19 and supply chain issues.

Response to inventory status WPs in ULTIMATE and delays due to COVID-19 and supply chain issues.				
	Current status (november 2022) - delay		Details	Mitigation plans
WP1	CS1 - 1.2.1	12 months	Delay in pilot plant construction (bench scale tests had to be extended due to high variation in WW composition, delay in meetings with different technologies suppliers and receiving commercial quotations.	Start-up of single pilot plant units as soon as they are available (UF+RO unit, MD unit and adsorption unit); still enough time to complete pilot tests
	CS2 - 1.2.2	12 months	Delay in starting up of pilot plant: new treatment train selected, bench scale validation needed. Design and construction of pilot plant started after bench scale validation.	First optimisation of operational parameters at bench scale; still enough time to complete pilot tests
	CS2 - 1.3.1	no delay		
	CS2 - 1.4.1	12 months	Delay in starting up of pilot plant: new treatment train selected, bench scale validation needed. Design and construction of pilot plant started after bench scale validation.	First optimisation of operational parameters at bench scale; still enough time to complete pilot tests
	CS3 - 1.2.3	6 months	Delay in delivery of sensors and meters; difficulties during installation	Portable meters have been used to get data for model calibration/validation
	CS3 - 1.4.2	8 months	Delays for the finalization of the pilot related to the contacted constructor; Long permitting and procurement procedure; Relevant difficulties for activation of hundreds kgs of hydrochar	Initial test of pilot plant with commercial activated carbon instead of renewable activated carbon. Hydraulic tests in May, effective operation in June
	CS4 - 1.2.4	6 months		





CS4 - 1.4.3	12 months	Delay in delivery of materials, scarcity of raw material; significant initial investment costs leading to the consequence, that the second part of EC payment is needed to complete the plant	Alternative suppliers, invest more time in understanding of processes on lab-scale
CS5 - 1.2.5	UF & RO: 2 months; AOP & UV: 7 months	Best time slot to implement the technology is after holidays in winter (low beer production); AOP & UV: Agreement with technology provider had required more time than expected	Still enough time to complete pilot tests
CS5 - 1.3.2	AnMBR: 13 months; SOFC: 13 months; ELSAR: 16 months	Unavailability of staff and lower availability of industrial stakeholder; ELSAR was upscaled --> higher effort for engineering work, overprices, license to build ELSAR. Building license took 9 months more than the maximum expected time. SOFC: Out of stock of electronic components brought delays in the plant assembling.	Start-up of small ELSAR (lab and pilot-scale) to gain results and valuable information for the upscaling in terms of process, operation and equipment, minimizing risks in the further industrial size. Still enough time to complete pilot experiments
CS5 - 1.4.4	no delay		
CS6 - 1.3.3	no delay		
CS6 - 1.3.4	9 months	Delay in obtaining permits for construction	First set-up and start-up at a different site (GSR Shefa-Amr); collect olive oil wastewater and store it (only available in summer)
CS6 - 1.4.5	13 months	Delay in delivery of materials, scarcity of raw material; significant initial investment costs leading to the consequence, that the second part of EC payment is needed to complete the plant	Alternative suppliers, invest more time in understanding of processes on lab-scale
CS7 - 1.3.5	1.3.5 & 1.2.6: 9 months 1.4.6: 10 months	Change of strategy: recovery and reuse of heat within ammonia stripping unit	Lab experiments are carried out in parallel to the design and construction of the pilot systems, iterative process to size and design best version within existing budget. Systems will be started in stages to allow for testing of the technologies installed first.
CS7 - 1.2.6		Due to lockdowns, there was only limited access to the labs for the laboratory experiments for the first year or so. Design had to be adapted due to changes on the other parts of the system. Also, the need to add a system (pre-precipitation) and unexpected high costs have led to further adaptation of the design. Finally, a late change in location to install the system on site led to more changes and delays.	
CS7 - 1.4.6			
CS8 - 1.3.6	no delay		





CS8 - 1.4.7	14 months	Delay in recruitment of PhD, analytical difficulties during lab experiments, delay in delivery of a sensor. Delay in the development of the industrial pilot.	Support by a partner research laboratory; simplification of pilot plant to save time in construction; modular unit for industrial pilot to be improved, when laboratory tests progress.
CS9 - 1.2.7	2-3 months	Unforeseen change of scenario 2 involving effluent from ozonation plant (plant was shut down to save energy)	Change back to scenario 1 (secondary effluent) until scenario 3 (industrial WW) is prepared.
CS9 - 1.3.7	no delay		
CS9 - 1.4.8	no delay		





4. Conclusion

This deliverable has introduced the risk management plan and the subsequent methodology. In this document, the risks identified at proposal stage has been supplemented with risk identified since the start of the execution of the ULTIMATE project. Based on this, some of the presented risks can be classified as general management risks, but also as more specific technical risks that relate to the technical work carried out in ULTIMATE.

Complementing the risk identification, the deliverable has presented the strategy and relevant procedures to overcome the risk and minimise their effects within the execution. The appropriate procedures have been established, which depend on the severity of the risk, their likelihood, and their repetition within the project execution. These procedures also include the identification of core partners that are, at different levels, responsible for the monitoring and management of the risks.

As a main conclusion of the document, the ongoing risk management in ULTIMATE has uncovered several risks that have been identified during the project. Mitigating actions have been taken, nevertheless some risks have materialised resulting in delays in the realisation of the case studies. These risks do not jeopardise that project outcomes at this point in time, and risk monitoring and management continues to ensure the project can complete the objectives set out in the Grant Agreement.

As a future work, the Risk management Plan is a live document that will be expanded progressively with newer risks and mitigating actions. For future versions of the plan, it is envisioned that the methodology will be reviewed and when necessary revised methodologies will be adopted.





Appendix I – Risk Management Register

Screenshot of the risk management register (RMR) which is available on the ULTIMATE SharePoint environment (\Documents\WP7\Risk Management Plan). This living document is available to all consortium partners and periodically updated by a request sent to the work package leaders.

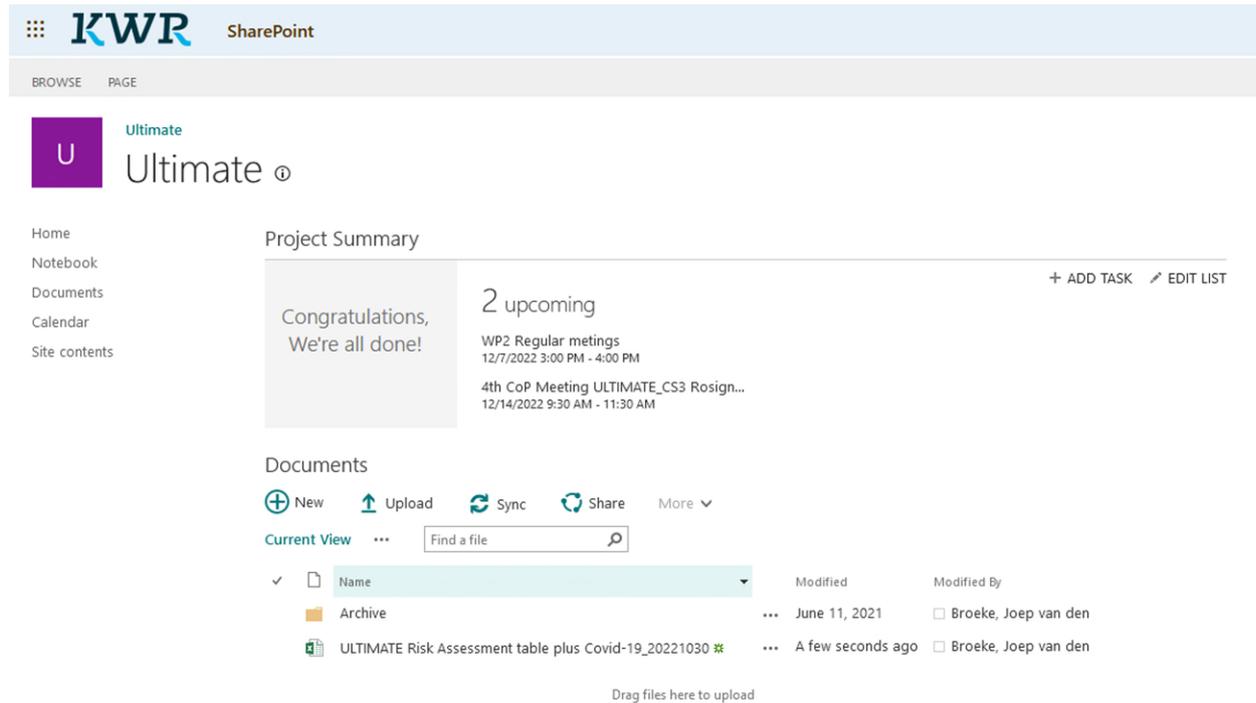


Figure 5: Screenshot of the RMR on Sharepoint.





Risk Number*	Description of Risk Risk Type / Risk Assessment**	Date of last evaluation	Did the risk materialize?	Please provide a short timeline of the risk. (e.g., What has happened? Why is it (not) relevant at the moment?, etc.)	Did you apply risk mitigation measures? (Yes/No)	If the risk mitigation measures couldn't be applied/ weren't applied, please explain why.
1	Project execution failure, technical problems and delays (key milestones or deliverables delayed) Risk Type: Management Probability/Impact: MH	25-6-2022 (WPI)	WPI: D1.2 will be the case for some CSs regarding (for more details see Risk (led in M1-5))	WPI: Yes, we told the CS to consider long delivery times, however, the CSs are not able to complete their experiments, for D1.2, laboratory tests to learn more and accelerate the set-up and optimization phase of the pilot.	Yes	
2	Limited coordination and communication among partners / WPI / risks Risk Type: Management Probability/Impact: LH	2/25/2021	No		No	
3	Low commitment of the partners in the priority path and delays Risk Type: Management Probability/Impact: LM	2/26/2021	No		No	
4	Administrative delays in start-up of the pilot (permits, licensing, building permit, site access, health and safety validation of operations) Risk Type: Management Probability/Impact: MM	4/25/2022	CS5: still waiting for the building license (since 8 months) for CS6G provided by the local government of the city of Lleida	part of the submission to obtain the building license in June 2022. The license will be issued in the next few weeks. The CSs will be able to start the pilot tests as well as possible. CS5 will contact the local government to obtain the license for the building (license needs to be verified by the Spanish State Air Quality Agency (AESA), which can require up to 3 months. Receiving the building license after that date	Yes	deleted the risk as the status to orange- as delays continue to exist.
5	Inadequate coordination of activities at case study level. Risk Type: management Probability/Impact: MH Low interest from local stakeholder	4/25/2022	No	No for all seems to be going fine	No	status to yellow as experience in first two years has shown that coordination

Figure 6: Screenshot of the RMR.

