



# **Project Management Handbook**

D1.1

April 2021

# Deliverable

PROJECT ACRONYM	GRANT AGREEMENT #	PROJECT TITLE
TWINERGY	957736	<b>Intelligent interconnection of prosumers in positive energy communities with twins of things for digital energy markets.</b>

## DELIVERABLE REFERENCE NUMBER AND TITLE

# D1.1 Project Management Handbook

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## DISSEMINATION LEVEL

- ✓ **P Public**
- P Confidential, only for members of the consortium and the Commission Services

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## Statement of Originality

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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# Executive Summary

The present document is the deliverable D1.1- "Project Management Handbook" of the TwinERGY project, funded by the European Commission's Innovation and Networks Executive Agency (INEA), under its Horizon 2020 Research and Innovation programme (H2020). The main objective of the deliverable is to become a reference document for the TwinERGY consortium regarding the procedures to be employed towards project management and implementation. The deliverable intends to complement the Consortium Agreement, Grant Agreement and D1.5- "Project Management Plan" provisions, regarding the project management and collaboration guidelines, which will build a working framework for the TwinERGY participants paving the way for successful project execution. The deliverable explains the roles and responsibilities of the consortium members within the project, describes the processes for managing the internal information flows, establishes procedures associated with changing management, and develops the Risk Management Plan of the TwinERGY project. The Project Management Handbook should be updated throughout the project, whenever the aforementioned procedures are modified or the TwinERGY participants agree on including additional information and processes.

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# 1. Introduction

The main aim of the TwinERGY project is to introduce an innovative energy system aligned with EU regulations that will combine existing advanced technologies into a new interoperable framework, business models and consumer-centric services to offer a comprehensive solution to empower citizen active participation into the new EU energy market. In this direction, the TwinERGY project will consider the involvement of energy consumers' associations, providing substantial knowledge regarding the consumers and the energy market relations, since consumer behavior is considered as the main concept for understanding, managing, and accomplishing sustainable energy consumption. In line with the above, TwinERGY is a "user-oriented" project in which the participation of consumers is important for a successful outcome. In this way, the consortium shows its respect to the European and national legislation regarding privacy and safety issues, as well as its concern about the privacy and safety protection of project participants.

## 1.1 Deliverable scope

The deliverable D1.1-"Project Management Handbook" is a manual intended to set the procedures, rules and responsibilities of the consortium aiming at ensuring an efficient and quality work progress of the project. Its purpose is to complement the legally binding documents (Consortium Agreement and Grant Agreement) as well as the deliverable D1.5-"Project Management Plan", which was submitted in the initial phase of the project implementation. This deliverable provides practical information for day-to-day management and can be modified any time during the project lifetime according to the TwinERGY needs. Whenever the deliverable is updated, all project participants will be duly informed about any modifications made with respect to the previous version.

## 1.2 Deliverable structure

The structure of this deliverable consists of the following chapters:

- Chapter 1 is the introductory deliverable section which presents the purpose, the structure, the reference documents, and the abbreviation list.
- Chapter 2 briefly presents general information about the project, its funding, and its participants.
- Chapter 3 describes the management structure of the TwinERGY project and explains the multiple roles of the consortium and the respective responsibilities. It also provides the appropriate guidelines for internal communication management and changing management requests.
- Chapter 4 develops the Risk Management Plan of the TwinERGY project.

- The final section of the deliverable contains the Annexes of the “Project Management Handbook”.

## 1.3 Reference documents

This document is based on the following reference documents:

- TwinERGY Grant Agreement No.957736
- Horizon 2020 AGA – Annotated Model Grant Agreement
- Horizon 2020 Online Manual: [https://ec.europa.eu/research/participants/docs/h2020-funding-guide/index\\_en.htm](https://ec.europa.eu/research/participants/docs/h2020-funding-guide/index_en.htm)
- D1.5 - “Project Management Plan”
- D13.1 - “H - Requirement No. 1”
- D13.2 - “POPD - Requirement No. 2”

## 1.4 Abbreviation list

Table 1 presents the main abbreviations used in this document.

*Table 1. Abbreviation list*

Acronym	Full Name
H2020	Horizon 2020
EC	European Commission
INEA	Innovation and Networks Executive Agency
DoA	Description of Action
GA	Grant Agreement
PC	Project Coordinator
PM	Project Manager
EM	Ethics Manager
EEAB	External Expert Advisory Board
PL	Pilot Leader
WP	Work Package
WPL	Work Package Leader
TL	Task Leader
DPO	Data Protection Officer
DPC	Data Protection Coordinator
PO	Project Officer
RFC	Request for Change

## 2. Project General Information

Table 2 presents some useful information about the TwinERGY project.

*Table 2. Project general information*

Project number:	957736
Responsible Unit:	INEA/H/01
Call:	H2020-LC-SC3-2018-2019-2020 submitted for H2020-LC-SC3-2020-EC-ES-SCC / 29 Jan 2020
Topic:	LC-SC3-EC-3-2020 - Consumer engagement and demand response
Type of Action:	Innovation Action
Duration:	36 months
Entry into force of the Grant:	31/08/2020
Project Start Date:	01/11/2020
Project End Date:	31/10/2023

### 2.1 Budget

The total eligible project cost amounts to 7,090,310.00 €. The maximum EU funding is 5,903,474.39 €, which counts for the 83.26 % of total costs.

### 2.2 Participants

The TwinERGY consortium is composed by 18 partners and 2 third parties from 12 European countries.

Table 3. List of TwinERGY participants

No.	Partner	Short Name	Country
1.	PANEPISTIMIO PATRON	UoP	Greece
2.	STAM SRL	STAM SRL	Italy
3.	TECHNISCHE HOCHSCHULE OSTWESTFALEN-LIPPE	TH OWL	Germany
4.	UNIVERSIDADE NOVA DE LISBOA	UNL	Portugal
5.	IES R&D	IES R&D	Ireland
	INTEGRATED ENVIRONMENTAL SOLUTIONS LIMITED	IES LTD	UK
6.	BENETUTTI	BENETUTTI	Italy
7.	UNIVERSITY OF BRISTOL	UNIVBRIS	UK
8.	KNOWLE WEST MEDIA CENTRE LBG	KWMC	UK
9.	SUITE5 DATA INTELLIGENCE SOLUTIONS LIMITED	SUITE5	Cyprus
10.	ETRA INVESTIGACION Y DESARROLLO SA	ETRA	Spain
11.	WORLD ENERGY CONSORTIUM P.L.C.	WEC P.L.C.	Malta
12.	MYTILINAIOS ANONIMI ETAIREIA	MYTILINEOS	Greece
13.	BRISTOL CITY COUNCIL	BCC	UK
14.	EUROPEAN DYNAMICS LUXEMBOURG SA	ED LUXEMBOURG	Luxembourg
	EUROPEAN DYNAMICS ADVANCED INFORMATION TECHNOLOGY AND TELECOMMUNICATION SYSTEMS SA	EDAT	Greece
15.	Stadt Steinheim	Stadt Steinheim	Germany
16.	IDEAS 3493 SL	IFC	Spain
17.	ARTHUR'S LEGAL BV	ARTHUR'S LEGAL	NL
18.	Smart Energy Europe	smartEN	Belgium

## 3. Project Management

### 3.1 Project management life cycle

The TwinERGY project operates as part of a complex ecosystem with a high degree of uncertainty. In the aim of optimal project goal achievement, the project management life cycle is broken down into a series of distinct phases: conceptualization/initiation, planning, implementation, monitoring, adapting and closure. The adoption of project management phases simplifies processes and provides an integrated tactic for ensuring that the project continues making progress as planned. Management phases are not independent but rather from a sequential process in which the outcomes of a phase act as the input for the following one. However, their relation should not be regarded as linear since it is reflected in a rather circular manner. The monitoring phase notifies the planning and implementing phases, in cases that changes are needed, the project adapts the modifications and this loop continues until there are no additional adjustments and all project deliverables have been successfully completed. The project management life cycle phases are defined as follows:

- ❖ **Phase 1 - Conceptualization/Initiation:** This phase includes the baseline and contextual information of the project, its general objectives and scope, its participants who will carry the workload throughout the project implementation. Phase 1 of the project management life cycle further involves the analysis of the problem and the identification of stakeholders needs. It also elaborates on the proposed work plan for execution, by defining the work packages and respective tasks to be implemented. During this phase the proposal is authorized and funded as a project.
- ❖ **Phase 2 - Planning:** Once the proposal has been approved, the next step is to redefine the objectives for the work packages implementation and develop detailed work plans, based on the fundamental overall work plan that was designed at the proposal phase of the project. These detailed work plans focus on managing the scope, schedule, budget, and quality of the project as well as on facilitating processes required for the project management. By committing time and effort in detailed planning, oversights made during the conceptualization/initiation phase can be handled in advance with no further impact to the project.
- ❖ **Phase 3 - Implementation:** The implementation phase includes the consortium coordination and resource allocation to perform diverse activities in order to obtain the desired outputs, according to the detailed project plans that have been previously developed. The outcomes of this phase are the communications with

stakeholders, the internal and external progress reports, either at a technical or financial level, and the project deliverables.

- ❖ **Phase 4 - Monitoring:** The monitoring phase includes all actions that aim in assessing the project progress, achievements and obstacles encountered, while measuring deviations from the baseline plan and the anticipated project quality level. Project monitoring runs unremittingly along all phases of the project life cycle and examines ways to take advantage of new or emerging opportunities to achieve the project objectives.
- ❖ **Phase 5 - Adaptation:** This phase is about reassessing the initial assumptions of the project and determining appropriate adjustments into project processes, strategies and methods or interventions as corrective measures that will contribute in delivering high quality results. Adaptation uses inputs both from the monitoring phase and the partner's experience from the project implementation. It typically takes place at the end of each project deliverable and is considered as a lesson learning approach aiming at advancing knowledge at all levels (individual, consortium, organizational, public) and at incorporating project findings in the following project deliverables.
- ❖ **Phase 6 - Closure:** The closure phase of the project management life cycle takes place when all planned goals have been achieved, all deliverables have been submitted, and all administrative tasks have been completed. This phase includes the project evaluation process, which consists of internal evaluations (conducted by the consortium to assess project efficiency, impact, and sustainability) and audit evaluations.

## 3.2 Management structure

The organizational structure of TwinERGY Consortium is fully described in the Project Consortium Agreement as well as in the deliverable *D1.5 - "Project Management Plan"*. The following Figure 1 identifies the management structure of the TwinERGY project and the interrelations within it.

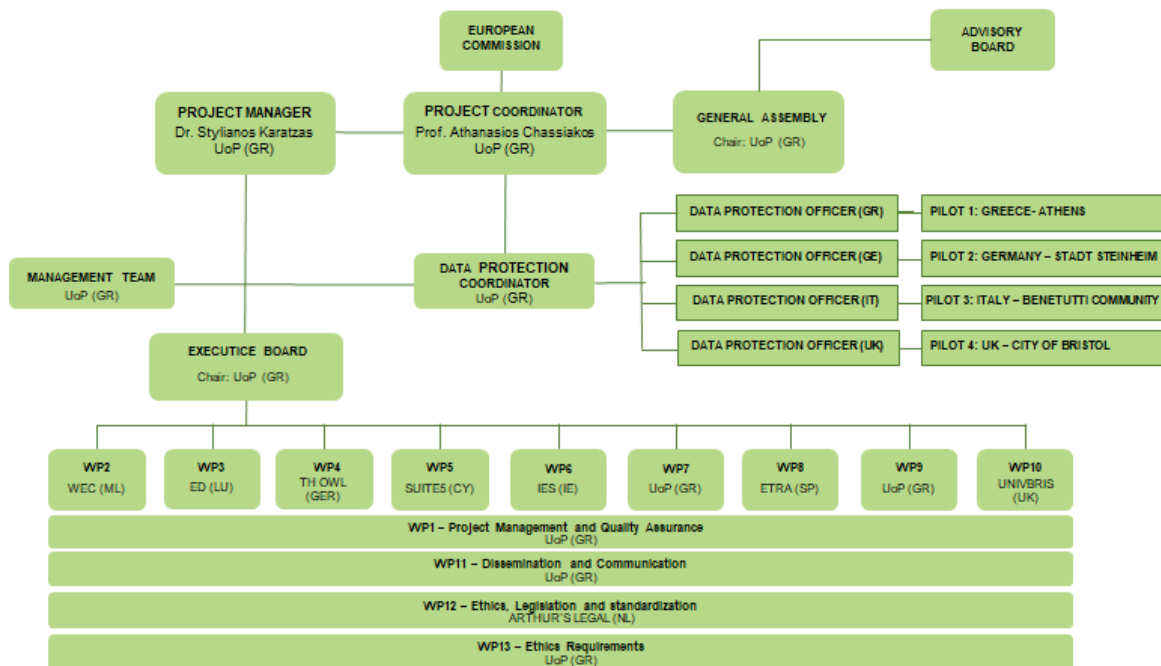


Figure 1. Management structure of the TwinERGY project

### 3.2.1 Project Coordinator

The Project Coordinator (UoP, represented by Prof. Athanasios Chassiakos) is ultimately responsible for the vision, ethics, and overall management of the project and also accountable for the project direction and success. More specifically, the Project Coordinator role is to:

- Coordinate the decision-making process.
- Be an intermediary between the project partners and the EC.
- Monitor the compliance of the Parties with their obligations.
- Collect, review, and submit reports, other deliverables (including financial statements and related certifications) and specific requested documents to the Funding Authority.
- Transmit documents and information related to the project to any other Parties concerned.
- Provide, upon request, the Parties with official copies or originals of documents that are in the sole possession of the Coordinator, when such copies or originals are necessary for the Parties to present claims.
- Distribute to the consortium the financial contribution of the Funding Authority to the project.
- Chair the meetings and monitor the implementation of decisions made during these meetings.



### 3.2.2 Project Manager

The Project Manager (UoP, represented by Dr. Stylianos Karatzas) is appointed by the Project Coordinator and is under his direct supervision, his role is to assist the work of the coordinator and the steering boards for executing the decisions of the consortium as well as for the day-to-day management. More specifically, the Project Manager role is to:

- Communicate with project partners on a timely basis.
- Track project progress against programme objectives.
- Prepare and process technical and financial reports.
- Organize teleconferences / project meetings / workshops / conferences.
- Have the overall responsibility for the complete management of the project.
- Appoint the Management Team.

### 3.2.3 General Assembly

The General Assembly is the ultimate decision-making body of the consortium, is composed of one representative of each partner of the consortium and chaired by the Project Coordinator. The General Assembly will be free to act on its own initiative to formulate proposals and make decisions in accordance with the procedures set out in the Consortium Agreement. In addition, all proposals made by the Executive Board will be considered and decided upon by the General Assembly. The main activities of the General Assembly are to:

- Approve proposed changes in Annexes 1 and 2 of the Grant Agreement to be agreed by the Funding Authority.
- Approve changes in the Consortium Plan.
- Approve the entry of a new Party to the consortium.
- Identify a breach by a Party of its obligations under the Consortium Agreement or the Grant Agreement.
- Declare a Party to be a defaulting partner.
- Approve the withdrawal of a Party from the consortium in case of defaulting partners.
- Propose to the Funding Authority for a change of the Coordinator.
- Propose to the Funding Authority a suspension of all or part of the project.
- Propose to the Funding Authority the termination of the project and the Consortium Agreement.

### *3.2.4 Executive Board*

The Executive Board is the supervisory body for the execution of the Project and consists of the Project Coordinator, the Project Manager and members of the Work Package leading partners appointed by the General Assembly. More specifically, the main activities of the Executive Board are to:

- Prepare the meetings, propose decisions, and prepare the agenda of the General Assembly.
- Monitor the proper execution and implementation of decisions of the General Assembly.
- Collect information for the project progress at least once every 6 months, examine this information to assess the compliance of the Project with the Consortium Plan and, if necessary, propose modifications of the Consortium Plan to the General Assembly.
- Approve the Members of the Management Team, upon proposal by the Coordinator.
- Support the Coordinator in preparing meetings with the Funding Authority and in preparing related data and deliverables.
- Prepare the content and timing of press releases and joint publications by the consortium or proposed by the Funding Authority in respect to the procedures of the Grant Agreement Article 29.

### *3.2.5 External Expert Advisory Board*

The role of the External Expert Advisory Board (EEAB) members is to shed light on critical decisions to be made at project level including the potential exploitation routes of the project results. The Advisory Board considers the progress of the project and its final results and provides advice to the Project Coordinator and the Executive Board. The Advisory Board is appointed and steered by the Executive Board. The support of the Advisory Board throughout the project duration plays a key role in ensuring high quality outcomes with increased potential replicability in other European cities. The main activities of the Advisory Board are to:

- Assist and facilitate decisions made by the General Assembly.
- Provide necessary advice to the consortium to reach the project objectives.
- Monitor major milestones and project risks and provide feedback to overcome them.
- Provide final assessment concerning the project results.

### 3.2.6 Ethics Manager

The Ethics Manager (EM) position represented in the TwinERGY project by ARTHUR'S LEGAL partner, will provide continuous guidance to project participants regarding ethical and data protection issues that may arise during the project lifetime. In addition, the EM will address any legal, privacy, and ethical issues regarding the technologies developed by the consortium and provide valuable input as part of the dedicated work under WP12. The Ethics Manager is also assigned to support TwinERGY partners in achieving compliance with the above applicable ethical principles and legislation.

### 3.2.7 Management Team

The Management Team supports the Executive Board, the Project Coordinator, and the Project Manager in executing the decisions of the General Assembly as well as in the day-to-day project management. The Management Team is nominated by the Project Manager and the Project Coordinator and appointed by the Executive Board. The main responsibilities of the Management Team are to:

- Monitor the work progress related to technical and administrative aspects of the project.
- Provide assistance at administrative level to project parties.
- Inform the Project Manager on a timely basis about important incidents in everyday project management.
- Contribute to project deliverable preparation and ensure their high-quality level.

### 3.2.8 Pilot Teams and Leaders

Each pilot implementation is carried out by the Pilot Team and the Pilot Leader. The Pilot Leader (PL) has the responsibility of technical, administrative, and financial coordination at pilot level. More specifically, the Pilot Leader role is to:

- Implement the overall management of the pilot site.
- Monitor the technical work of the pilot demonstration.
- Monitor the resource usage with respect to the initial plan.
- Establish communication channels with local pilot partners.
- Identify and manage risks in pilot implementation, propose, apply and monitor risk mitigation measures to meet project requirements, in case of deviations from the baseline work plan.
- Contribute to project deliverable preparation and ensure their high-quality level.
- Call for pilot meetings whenever it is considered necessary.

- Report to the Executive Board.

### *3.2.9 Work Package Teams and Leaders*

Each Work Package is realized by the Work Package Team and the Work Package Leader. The Work Package Leader (WPL) ensures the coordination among the different project teams that collaborate in the Work Package and the effective exchange of intermediate results among Work Packages. The WPL further ensures timely task execution in the Work Package and stimulates the interaction among the various partners involved. More specifically, the WPL role is to:

- Orchestrate and supervise multiple tasks and activities within the WP.
- Propose work plan modifications to the Executive Board, if necessary.
- Inform the Project Manager about the task progress of the WP.
- Call progress meetings, if needed, to inform all WPLs, the Project Manager and the Project Coordinator about important issues that may have arisen.
- Contribute to project deliverable preparation and ensure their high-quality level.
- Report to the Executive Board.

### *3.2.10 Task Leaders*

The management responsibility of each task is attributed to the appointed task partner, who nominates an individual as the Task Leader. The Task Leader (TL) is responsible for coordinating and reporting the work done by all task participants. The Task Leader appoints specific roles and responsibilities to each supportive partner involved in the task. The Task Leader presents the task progress to the Work Package Leader on a timely basis.

### *3.2.11 Data Protection Officers*

The Data Protection Officer (DPO) is responsible to oversee the data protection strategies and regulation compliance of all Parties involved in each pilot. The DPO has to ensure that the data protection rules are respected in cooperation with the Data Protection Coordinator. More specifically, the DPO role is to:

- Ensure that data subjects are informed about their data protection rights, obligations and responsibilities and raise awareness about them.
- Exchange advice and recommendations with the Ethics Manager and the Data Protection Coordinator about the interpretation or application of the data protection rules.
- Create a register of processing operations within the pilot and notify the Data Protection Coordinator about those that present specific risks.

- Ensure data protection compliance within the various procedures of the project and help those responsible to be accountable in this respect.
- Handle queries or complaints on request by the Pilot Leaders, the participants, other person(s), or on his/her own initiative.
- Cooperate with the Data Protection Coordinator, on request, about complaint handling, inspections conducted by the Data Protection Coordinator, etc.

### 3.2.12 Data Protection Coordinator

The Data Protection Coordinator (DPC) is an independent function in TwinERGY project management structure appointed by the Consortium Leader (University of Patras) and established to coordinate the Data Protection Officers per piloting site aiming at providing the Project Coordinator with a comprehensive overview at the operational level. The DPC is responsible to:

- Advise, identify, mitigate, and monitor the risk of non-compliance with data protection laws, regulations, rules, standards, and codes of conduct.
- Be the main contact person about Data Protection in TwinERGY towards the regional pilot DPOs.
- Be the main contact about Data Protection for TwinERGY partners for issues beyond the Ethics Manager responsibilities.
- Report regularly to the Project Coordinator on compliance.
- Support the Management Team units.
- Ensure a smooth hand-over from the GDPR implementation project to achieve an effective operational GDPR process in TwinERGY.
- Ensure smooth transition to the new collaboration framework between the EU and UK.

## 3.3 Communication and information flow management

The management structure and the internal communication tools, that have been described in detail in the deliverable *D1.5 - "Project Management Plan"*, were selected to assist in developing and implementing efficient management procedures at all project levels. In order to achieve this goal, it is essential to establish diverse communication channels covering the different needs at WP, Project and EC levels, so as to assure participant coordination and objective realization. Figure 2 shows the information flow within one or multiple management levels, enabling the visualization and deeper understanding of the interactions among the established management bodies and the overall consortium throughout the project implementation.

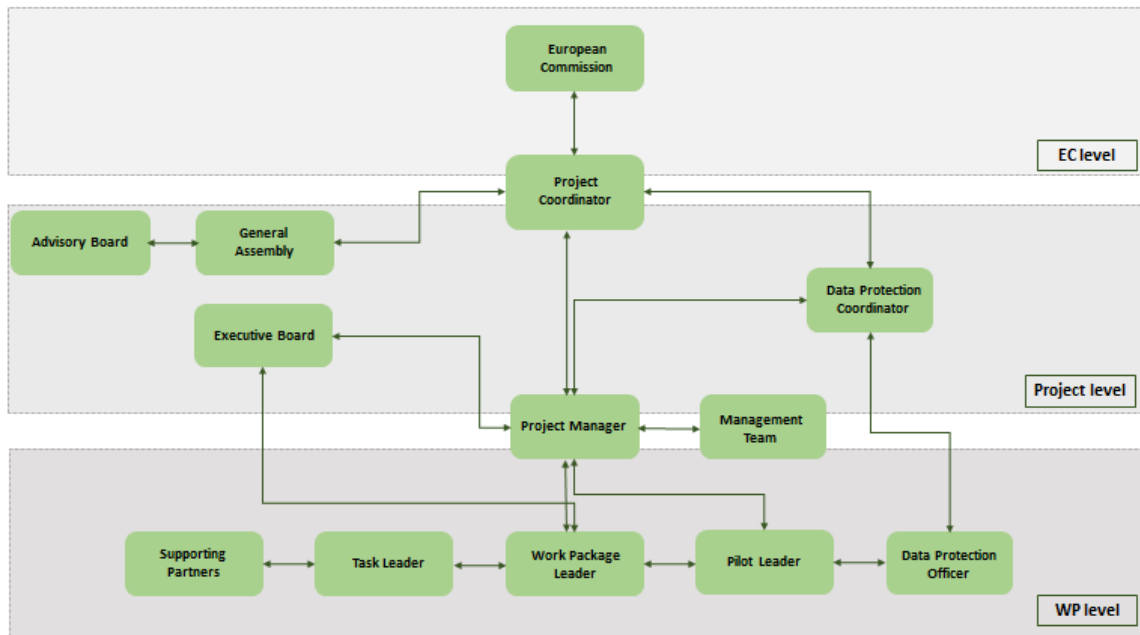


Figure 2. Information flow within the TwinERGY consortium

All issues concerning task progress should be communicated from each supporting partner to the Task Leader and then to the Work Package Leader. The same principle applies for any issues concerning the pilot demonstrations. In particular, any problem (e.g., delay) should be reported by the Pilot Leader to the respective Work Package Leader. The WPL is responsible to deal with the problem and may ask the Project Manager for assistance to it. If an issue cannot be resolved by the Project Manager and the Management Team, the Project Coordinator will be informed and asked for assistance while, if necessary, the issue will be discussed in the Executive Board. The Project Coordinator will resolve any issues put up by the Project Manager or communicate them to the Project Officer, if necessary.

### 3.4 Change management

Change management is a process of requesting, reviewing, approving, carrying out and controlling changes to a project direction or core deliverables that will affect the project results, whether it is impact, budget, or timeframe. A well-defined process for change management is presented below. It includes in detail the responsibilities, tolerances for change at different project levels, and the tools to use in order to manage the change process.

Every TwinERGY participant may raise a Request for Change (RFC). The Project Coordinator will then ensure that this is captured and proactively managed to conclusion. An initial review should be made to examine the need for the change, how it could be achieved and

what the consequences might be. The most appropriate member of the Consortium will normally perform this review. Based on these conclusions, a recommended course of action will be proposed. The diagram in Figure 3 highlights the TwinERGY approach to change management.

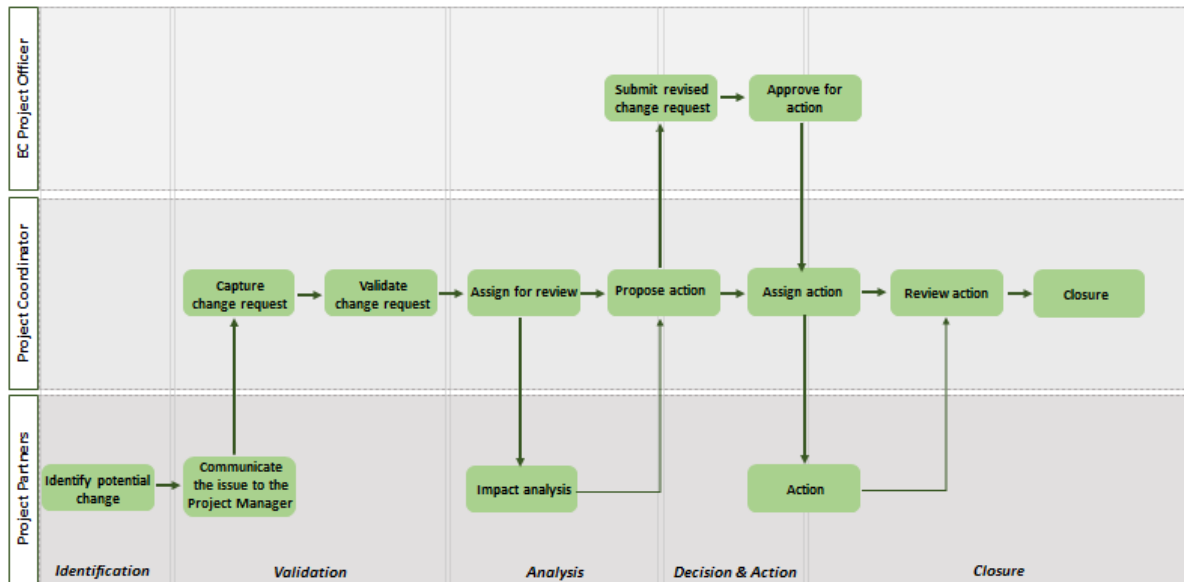


Figure 3. Change management process

More specifically, a multi-level approach is used to track each request from the time of appearance till its effective closure through six phases:

1. Identification
  - i. Any TwinERGY partner may identify potential changes and record the issue.
2. Validation
  - i. The Project Manager and the Management Team collect the request submitted by the beneficiary and identify the beneficiary as the issue owner.
  - ii. The Project Coordinator validates change request with project team members as appropriate.
  - iii. The PC evaluates the proposed change based on its necessity to the project.
3. Analysis
  - i. The PC assigns to the most appropriate partner the effort to assess the scope, budget, and schedule impact of the change.
  - ii. The change request is enhanced with impact analysis and estimations in respect to the above considerations.
  - iii. The impact analysis is submitted to the PC.

#### 4. Decision

- i. In case that there is no impact foreseen regarding project scope, budget, or schedule, the PC decides on whether to approve or dismiss the change request.
- ii. If the change request needs to be discussed with the General Assembly, the PC places the issue on the agenda for the next meeting or requests an extraordinary GA meeting, if the issue to be addressed is urgent.
- iii. If a change request is foreseen to have impact on the project scope, budget, or schedule, the PC consults the Project Officer
- iv. The PC makes the final decision on whether to proceed with the change.

#### 5. Action

- i. The PC makes any necessary actions to integrate the change into appropriate procedures, plans and timeframes.
- ii. The PC submits the proposed action plan for change integration to the PO.
- iii. The PO reviews the PC proposition and approves the action or requests its revision.

#### 6. Closure

- i. The PC closes the change request.
- ii. The PC communicates the updated work plan to the project participants and assigns all necessary actions to the appropriate consortium members.
- iii. The PC monitors and reviews the progress of these actions against the project plan.



## 4. Risk Management

Risk management is an ongoing process throughout the TwinERGY project life cycle, which combines the individual procedures for identifying, assessing, and evaluating potential risks, as well as for establishing response mechanisms and monitoring/reporting processes, into a unified course of action. The identification of potential risks for the efficient implementation of project activities and the determination of preventive mechanisms or mitigation measures to decrease their impact will be promptly updated throughout the TwinERGY project, whenever this is deemed necessary.

### 4.1 Overall strategy

Risk Management in the TwinERGY project is applied in three management levels: Strategic Level, Executive Level and Operational Level.

- In the Strategic Level, Risk Management focuses on the relations of the beneficiaries within the project. In this level, risk management is mainly the responsibility of the Project Coordinator and the Project Manager; however, the whole consortium should be involved in this process with each risk being assigned to respective partners.
- In the Executive Level, risk management attention is directed in managing risks threatening Work Package objectives. In this level, the necessary actions to overcome the potential risks are under the responsibility of the Project Coordinator, the Project Manager, and the Work Package Leaders.
- In the Operational Level, risk management deliberates on activities within each specific Work Package. In this level, the responsible parties for managing the respective risks are the Work Package Leader supported by the Task Leaders.

Regardless of the management level, the Risk Management Process follows five main steps to address the risk occurrence and response during the project lifecycle. These phases include Risk Identification, Assessment, Response, Monitoring, and Reporting. The above functions are executed in a sequential and circular manner to overcome any potential project risks, as indicated in Figure 4.



Figure 4. Risk management strategy

## 4.2 Risk identification

Risk Identification is an iterative process that acts proactively in order to discover potential project risks before they occur. An initial risk identification has been implemented at the project proposal phase, and has been re-examined and updated by the Project Coordinator and the Project Manager, in the present deliverable, with input coming from the Work Package Leaders at the current stage of the TwinERGY project. The Risk Identification remains a continuous process throughout project duration and its findings are to be documented in a Risk Register and discussed during the monthly Progress Meetings. The potential risks may fall to the following five categories:

1. Management risks
2. Technical risks
3. Pilot risks
4. Communication/Dissemination risks
5. Exploitation risks

This classification facilitates the successive processes of the risk management cycle. Risk Identification remains a continuous process throughout project duration and its findings are to be documented in a Risk Register and discussed during the monthly Progress Meetings

## 4.3 Risk assessment

Following risk identification, risk assessment is performed for a single risk or a set of risks with main tasks the appointment of risk owner(s) (partners responsible for managing the risk) and the establishment of measures to appraise the potential risk effect on project scope, cost, or schedule. A risk exposure factor is assessed in the TwinERGY project based on two

risk parameters, the likelihood to occur and the anticipated impact severity in project implementation, as illustrated in the risk matrix of Figure 5. The likelihood and impact severity of each risk are estimated by the joint work of the Project Coordinator, Project Manager, and the Work Package Leaders, using the following classes:

- ❖ Likelihood:
  - Low (very unlikely to happen, but not impossible)
  - Medium (possible to happen)
  - High (more likely to happen than not)
- ❖ Severity:
  - Low (relatively trivial impact on the project)
  - Medium (measurable impact on the project)
  - High (major impact on the project)

The combination of likelihood and impact severity is used to assess the risk (exposure) level so as to enable the prioritization and response allocation effort among the identified risks. The risk (exposure) level is appraised in three classes (Low, Medium, High) indicated with appropriate colours in Figure 5 as follows:

- ❖ Green indicates a low risk level
- ❖ Yellow indicates a medium risk level
- ❖ Red indicates a high-risk level

	LIKELIHOOD		
SEVERITY	High	Medium	Low
High	High	High	Medium
Medium	High	Medium	Low
Low	Medium	Low	Low

Figure 5. Risk parameter levels and exposure

## 4.4 Risk response

At the Risk Response phase, the risk owner(s) develops an action plan in order to control an observed risk by forming appropriate strategies in the directions of risk avoidance, mitigation, or acceptance. The aforementioned strategies are briefly outlined below.

1. Avoid risk: This strategy intends to prevent or eliminate the causal factors of the risk before it occurs.
2. Mitigate risk: For risks that cannot be fully prevented, the risk owner develops a response plan to reduce the risk impact on the project to an acceptable level.

3. Accept risk: The risk is handled as an issue in case it arises but there are no further actions or resource allocation for controlling the risk. This strategy is solely adopted in cases of low-level risks or when none of the previously mentioned strategies is feasible.

For each identified risk of a medium or high level, a response plan will be set up with preventive and/or corrective actions to be performed, responsibility assignment, and mitigation measure development, as a contingency plan, in case that the risk cannot be avoided.

## 4.5 Risk monitoring

For every identified risk (either initially or during project implementation), the respective risk owner will be held responsible to monitor risk evolution and evaluate the effectiveness of the assigned response plans in a continuous manner. Risk monitoring should include the following activities:

1. Analyzing existing risks and updating likelihood and impact severity measures.
2. Identifying new risks and planning appropriate actions.
3. Reviewing and updating response plans.
4. Reviewing the effectiveness of the overall risk management process and introducing new approaches or techniques for risk control.

Within each WP, all information coming from risk monitoring should be communicated by the risk owner to the Work Package Leader. In cases of high-level risks which require risk management modifications, the WPL will inform the Project Manager and the Project Coordinator for approval.

## 4.6 Risk reporting

As described in the deliverable *D1.5-“Project Management Plan”*, there will be an internal reporting process every six months which will include the report on project risk management filled in by the Work Package Leaders, who will be supported in this task by the assigned risk owners. Moreover, all information related to identified risks, their likelihood to occur, their impact on the project and the response plans will be constantly documented in the TwinERGY Risk Register and be kept updated throughout the project lifetime. Finally, the risk owners and/or the WPLs should report to the Project Coordinator and the Project Manager regarding the management of each risk, during the monthly Progress Meetings or the Executive Board Meetings that take place every four months.

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## 4.7 Risk Register

TwinERGY Risk Register is the central repository for all identified project risks and is used as the main tool to support the Risk Management process. The Risk Register is maintained by the Project Manager with inputs mainly from risk owners and Work Package Leaders and is constantly updated as the project evolves. In practice, the TwinERGY Risk Register consists of an Excel spreadsheet that is available to all consortium members through the project internal repository. An initial list of risks had been identified at the project proposal phase by the consortium members and was included in the DoA. The list has been updated and enriched with information provided by the WP Leaders to be converted into the current Risk Register form. The risks that have been identified during the first six months of the project implementation are classified, based on risk category, and are presented in the Annexes of the present deliverable D1.1- "Project Management Handbook".

# Annexes

## Annex 1 - Risk Register template

No.	Risk category	Risk type	Description	WPs affected	Likelihood	Severity	Risk level	Proposed mitigation measures	Responsible partner(s) for mitigating risk
	1. Management risks	e.g interoperability issues			1. Low	1. Low	1. Low		
	2. Technical risks				2. Medium	2. Medium	2. Medium		
	3. Pilot risks				3. High	3. High	3. High		
	4. Communication/ Dissemination risks								
	5. Exploitation risks								

## Annex 2 - Risk Register: Management Risks

No.	Risk category	Risk type	Description	WPs affected	Likelihood	Severity	Risk level	Proposed mitigation measures	Responsible partner(s) for mitigating risk
1	<b>Management risks</b>	Project management issues	Slow delivery and lack of agile management capacities	WP3	Low	High	Medium	Adoption of Agile management Project Management Philosophy, in conjunction with a specific protocol of procedures, utilizing the internal mechanisms for quality assurance and on time delivery of the project.	UoP, ED LUXEMBOURG
2		Requirements scope creep	Conflicting requirements identified after specification; could render modules unusable in UC or pilot context	WP5, WP6, WP7, WP9	Low	High	Medium	Early engagement of pilot leaders with module and platform developers; iterative implementation processes	Suite5, IES R&D, UoP
3		Objectives misalignment	Failure to properly align the pilot delivery processes (timing, objectives, complementarity of outcomes, validation of results)	WP4	Low	Medium	Low	Methodological framework to ensure delivery alignment	UNIVBRIS, TH OWL
4		Data access/collection	Difficulty to access partners' physical sites due to the impacts of the ongoing pandemic may also restrict data collection required for the deliverables	WP10	Medium	Low	Low	Regular online contact maintained; ensure logical access provisioned early.	UNIVBRIS
5		Project implementation issues	Unexpected delays in delivering results/outcomes deriving from WP2, WP4 and WP9, and more specifically the tasks that will provide input into WP5	WP5, WP6, WP7, WP8	Low	High	Medium	1. Tight management workflow 2. Effective progress monitoring 3. Planning activities before the actual beginning 4. Good cooperation relations among partners	SUITE5, UoP
6		Communication issues	Partners not reacting as expected, lack of communication.	ALL	Low	Medium	Low	Use of further interactive communication means (use the phone when e-mail is not enough) and/or liaise with additional persons in the institution. Ultimately, apply mitigation measures contained in Consortium Agreement.	All partners
7		Management issues	Risk of a delay regarding deliverables or official notifications to the EC.	WP1	Low	Low	Low	The Management Team with the support of the Project Coordinator will establish a feasible calendar that will be followed and controlled by each partner, activity leaders and executive committee.	UoP
8		Consortium changes	Key people in the consortium leave creating knowledge gap in the project	WP1	Low	High	Medium	Plans and knowledge will be documented. Partners will be responsible, as outlined in the Consortium Agreement, for replacing members of staff with someone of the same standard.	All partners
9		Schedule Impacts	Delays in obtaining information from the pilot sites will have an impact on the ability to develop the Building and Community DTs	WP6, WP7	Medium	High	High	Pilot sites will be engaged early in the task. Ongoing communication with pilot sites to ensure that appropriate Level of Detail is presented to enable the development of the DTs.	IES R&D
10		Schedule Impacts	Delays in the development of the data management platform as well as the definition of the project architecture may result in delays in the development of the DT architecture	WP6, WP7	Low	Medium	Low	Ongoing discussions from WP4 and WP5 will continue to ensure that any requirements arising from WP4 and 5 are IES R&D captured in the DT Platform.	IES R&D
11		Scheduling Impacts	There are tasks that are overlapping that should occur concurrently. For example, the DT deliverables are currently due to be delivered in IM2, yet activities in WP4 and WP5 that have an impact on WP6 occur after this date.	WP6, WP7	Medium	High	High	An amendment has been submitted to the EC for approval proposing an alternative schedule. WP6 partners remain highly engaged in preceding WPs to ensure that requirements are clear.	IES R&D

## Annex 3 - Risk Register: Technical Risks (Part A)

No.	Risk category	Risk type	Description	WPs affected	Likelihood	Severity	Risk level	Proposed mitigation measures	Responsible partner(s) for mitigating risk
1		Interoperability issues	Difficulty to liaise with other European projects.	WP3	Medium	Medium	Medium	Some of the consortium members are already active in (a) the BRIDGE working groups and (b) EU-research projects that address similar challenges. Therefore the participation of TwinERGY to BRIDGE and the interaction with other projects in the field will be guaranteed. Moreover, active BRIDGE members -also part of the TwinERGY consortium- will provide the first feedback to align the TwinERGY strategic goals with other projects, will act as the liaisons with other projects and will bring -through the WP3 dedicated tasks- the results of other projects for consideration.	ED LUXEMBOURG
2		Interoperability issues	Poor feedback from other projects to identify common ground that could support the interoperability/standardisation vision of TwinERGY - difficulty in the adoption of lessons learnt in the TwinERGY design.	WP3	Medium	High	High	The consortium members will follow a top-down and bottom-up approach to assure that (a) the outcomes and lessons learnt from other projects are being considered by the technology providers and end users of the TwinERGY consortium, and (b) the real needs of the end-users are being demonstrated and matched with the practices available. This will take place under the BRIDGE thematic pillars, i.e. on Data management, on consumer engagement and on regulation, and will facilitate the envisioned interaction starting from European common practices and reaching the TwinERGY use-cases needs.	ED LUXEMBOURG
3		Interoperability issues	The final TwinERGY Platform will have interoperability issues meaning that seamless integration of all components is not possible.	WP4, WP5, WP6, WP7	Low	High	Medium	1. Ongoing communication and discussion between partners throughout development. 2. Interoperability facilitated through the Task 4.4 - Architecture. 3. DTs will be accessible through well established APIs that will be made available throughout development.	All technical partners
4	<b>Technical risks</b>	Interoperability issues	Interoperability issues between some software components.	WP7, WP8	Medium	High	High	Proposal of a detailed testing plan that may arise interoperability situations not contemplated at a definition stage.	All technical partners
5		Data collection issues	Difficulty in surveying the necessary number of individuals for the consumer behavior study to be "representative".	WP4, WP6	Low	Medium	Low	The questionnaire will first be revised by the support partners to guarantee its feasibility and understandability. Then, all partners will help to distribute the online questionnaire in their own country. Also UNL will resort to a subcontracted organization to help in this activity (as it is planned in the agreement)	UNL, TH OWL
6		Data collection issues	Data from meters is lost through communication/connectivity on site.	WP5, WP6, WP7, WP9	Low	Medium	Low	IES' SCAN platform is robust and supports multiple file types and data sources. The integration of the Data Management Platform will ensure this risk remains unlikely to occur.	IES R&D, SUITE5
7		Inefficient data modelling	Data models could be inefficient to support all the communication process required by the system.	WP5, WP6, WP7, WP8, WP9	High	High	High	Set a plan to establish a common understanding through frequent communications. This scope must allow the common understanding of all the communication flows for partners involved.	SUITE5
8		Component failure	A component in the system's architecture may fail once it has been installed and deployed.	WP4, WP5, WP6, WP7, WP8	High	Medium	High	Set a plan to identify the problematic issues at an early stage of deployment. Develop a continuous testing plan and bug issue tracking so that component failures can be identified at an architectural level.	ETRA, TH OWL
9		First version of components	At an early stage of the project, the first version of components may not be mature enough to test all functionalities contemplated in the project.	WP5, WP6, WP7, WP8	High	Medium	High	Establish a communication channel within module's responsibilities to: 1. Communicate the missing functionalities on the first iteration 2. Agree on the minimum acceptable functionalities 3. Communicate the maturity of the produced solution	UoP



## Annex 4 - Risk Register: Technical Risks (Part B)

No.	Risk category	Risk type	Description	WPs affected	Likelihood	Severity	Risk level	Proposed mitigation measures	Responsible partner(s) for mitigating risk
10		Integration failures with devices and smart grid assets	Failures happening in the process of integration of field devices and distributed smart grid assets	WP8, WP9	High	High	High	Establish a clear plan with an assignment of the roles and responsibilities of each partner related to the implementation of the field devices and the smart's grid assets.	ETRA, Pilot Leaders
11		Integration failures with the modules	Failures happening in the process of integrating the modules.	WP6, WP7, WP8	High	High	High	Establish a clear plan with a clear assignment of roles and responsibilities to each partner related to the implementation of the modules developed in WP6 and WP7.	ETRA, IES R&D, UoP
12		Integration failures with the final system	Failures happening in the integration of the solution in real-life conditions in the pilot sites.	WP8, WP9	High	High	High	Establish a clear plan with a clear assignment of the roles and responsibilities of each partner involved in the system integration and in the pilot demonstrations.	ETRA, Pilot Leaders
13		Integration issues	Lack of technical expertise for integrating data and application end-points to the CDMP.	WP5, WP6, WP7 - WP8	High	High	High	The CDMP will provide appropriate User Interfaces to guide the technical personnel of the demo sites and application developers to either upload their data or retrieve data in the most efficient and effective manner. Relevant training sessions will be performed to make them familiar with the process to be followed and the way they will setup their interactions with the platform. Both demo partners and technical partners involved in integration activities, will allocate the required resources and assign appropriate personnel to ensure the smooth realization of the respective activities.	SUITE5, UoP, IES R&D, STAM, TH OWL, UNIVBRIS, ETRA, WEC, ED LUXEMBOURG
14		Integration delay	A delay in the integration and deployment of the solution may happen due to diverse factors.	WP8	High	Medium	High	To avoid this risk, it would be proposed a clear plan in which: 1. The roles and responsibilities are clear 2. Concretize plan activities 3. Create communication channels to inform about delays in time, so as involved partners can be aligned and aware of these delays.	UoP, ETRA, Pilot Leaders
15		Failure of the integrated solution	The integrated solution fails to be representative on the pilot's scenarios.	WP8, WP9	Medium	High	High	Establish a communication channel to understand at an early stage what is expected from Pilots. In addition, add an early stage of testing the solution so as to identify those integration parts that may be problematic for pilots. It is required a high collaboration between the technical partners and the Pilot partners.	UoP, ETRA, Pilot Leaders
16		Platform Functionality	DTs are not capable of appropriately optimizing and forecasting demand requirements for the buildings and community.	WP6, WP7	Low	Medium	Low	IES have a proven track record in implementing novel and innovative algorithms within their DT platform. Internal discussions on how to complete the requirements of the TwinERGY projects are ongoing at IES and will be continued through the development of the system.	IES R&D
17		Changing requirements	Continuous changing requirements in the process of developing the solution may occur.	WP4, WP5, WP6, WP7, WP8, WP9	Medium	Medium	Medium	Each partner must be aware of the content and specifications set in the deliverables. Partners have to pivot with their solution, but these changes must be fully registered and communicated to the partners involved.	UoP
18		Technical disagreement	Each technical partner may have a different approach to tackle the problems established during the project's development.	WP4, WP5, WP6, WP7, WP8	Medium	High	High	Determine a frequent communication channel between technical partners to ensure a consensual solution of partners.	UoP
19		Delay on the pilots	Some problems may arise during the pilot's implementation phase regarding the installations in the pilots and the end-users premises. This could have an effect on the integration of the solution regarded in WP9.	WP8, WP9	High	Medium	High	Establish a clear communication between pilot partners, end users and technical partners. Add contingency plans in case there are delays on the delivery of devices or in case they do not work as expected.	Pilot Leaders

## Annex 5 - Risk Register: Pilot Risks

No.	Risk category	Risk type	Description	WPs affected	Probability	Impact	Risk level	Proposed mitigation measures	Responsible partner(s) for mitigating risk
1		Lack of pilot interaction (physical and/or online)	Pilot delivery converging to silos with little exchange of learning and economies of scale taking place.	WP9	Medium	Medium	Medium	Regular inter-pilot contact and working meetings are taking place as agreed through the methodological framework.	UoP, UNIVBRIS
2		Availability of results from Pilots for evaluation.	Unforeseen circumstances cause limited outputs for evaluation against KPIs and considering impact of exploitation as planned.	WP9, WP10	Low	Medium	Low	Focus on 'quick wins' through prioritisation of UCs to ensure tangible outcomes for some KPIs.	UoP, UNIVBRIS, THLOWL, MYTILINEOS, STAM, BCC, BENETUTTI, Stadt Steinheim
3		Data availability issues	Reluctance from pilot partners to provide data.	WP5, WP6, WP7, WP8	Medium	High	High	Early distribution of the data landscaping template to partners to capture datasets that are already available or will be made available throughout the project, providing information about their format, granularity, upload method etc. In case of delays or limited cooperation, involvement of the Project Coordinator to resolve any issue.	SUITE5, UoP
4		Data protection/management	Pilots need to work with technical partners to determine what personal data the digital twin will collect, use and store, who will collect it, who it will be shared with and procedures for managing and deleting it. This information is required to submit university research ethics application in Bristol, which is needed to recruit pilot participants to work with to co-design the data use licence template. This is complex as it involves many partners. A delay in getting the information from technical partners would delay submitting the university ethics application which would reduce time available to recruit participants and delay this deliverable.	WP4, WP5, WP6, WP7, WP8, WP9, WP12	Medium	Medium	Medium	Needs to be good communication from technical partners on data collection and management. There is an important role for UoP and SUITE5 here in collection of information on data management which feeds into WP4, data management plan and GDPR compliance. UNIVBRIS, KWMC, BCC, IFC will work closely to develop UNIVBRIS research ethics application for Bristol pilot and align it with data license development work and share learning with other pilots.	UNIVBRIS, KWMC, BCC, UoP, SUITE5
5		Management/Communication	Receiving timely input by all pilots that will allow for an interim assessment of legal and ethical compliance in M24 and for a final assessment.	WP12	Medium	High	High	Timely communication with the pilot leaders and close collaboration with the project coordinator having a good overview of the technical progress across all pilots.	Pilot Leaders, ARTHUR'S LEGAL, UoP
6		Pilot Engagement	Participants are reluctant to engage appropriately with the tools (such as wearables/ modules) during development and testing.	WP6 WP7	Medium	Medium	Medium	Extensive testing and participant feedback will be completed during development to maximize uptake and engagement.	IES R&D, UoP
7		Communication issues	Pilots do not find the right channels to communicate and engage the consumers into the project.	All	Low	High	Medium	Pilots share good practices. Pilot leaders support open communication and transparency. Communication experts of TwinERGY provide supporting material and help to get visibility in the social media.	UoP, IFC, KWMC, smartEN, Pilot Leaders

## Annex 6 - Risk Register: Communication/Dissemination Risks

No.	Risk category	Risk type	Description	WPs affected	Likelihood	Severity	Risk level	Proposed mitigation measures	Responsible partner(s) for mitigating risk
1	<b>Communication/Dissemination risks</b>	Insufficient representation of stakeholder's requirements in use cases.	It is possible that not all stakeholder's requirements are registered or identified in the use case definitions. It may affect the definition of the overall architecture.	WP2, WP4	Medium	High	High	Establish a clear plan to not miss any of the stakeholder's requirements. Establish a clear communication channel between partners and stakeholders.	WEC, TH OWL
2		Miscommunication between the UML definition of the use cases and the stakeholder's requirements.	Incorrect identification of stakeholder requirements in for the use case definitions in the UML diagrams.	WP2, WP4	Medium	High	High	Establish a follow-up revision plan during the definition of UML so that no requirements are missed.	ETRA, TH OWL
3		Completeness of output.	Deliverable omits key information on tools and methods used.	WP4	Low	Low	Low	Deliverable peer-review	UNIVBRIS, TH OWL
4		Results dissemination challenges.	Relating outcomes back to the partners and organising of follow up meetings.	WP10	Low	Low	Low	Hybrid or online workshops/events organisation	UNIVBRIS
5		Integration issues.	Lack of technical expertise for integrating data and application end-points to the CDMP.	WP5, WP6, WP7, WP8	High	High	High	The CDMP will provide appropriate User Interfaces to guide the technical personnel of the demostites and application developers to either upload their data or retrieve data in the most efficient and effective manner. Relevant training sessions will be performed to make them familiar with the R&D, STAM, TH process to be followed and the way they will set up their interactions with the platform. Both demo partners and technical partners involved in integration activities, will allocate the required resources and assign appropriate personnel to ensure the smooth realization of respective activities.	SUITES, UoP, IES R&D, STAM, TH OWL, UNIVBRIS, ETRA, WEC, ED LUXEMBOURG
6		GDPR breach due to interviews with consumers and stakeholders	The interviews are conducted with internal and external members. There is a risk of privacy exposure.	WP2	Medium	Medium	Medium	The T2.2 team will use Qualtrics platform, a GDPR friendly platform. Besides, the team will ensure all interviews and selection procedures follow ethical guidelines, such as the informed consent, validated by the Twenergy consortium and the WP2 leader.	UNL

## Annex 7 - Risk Register: Exploitation Risks

No.	Risk category	Risk type	Description	WPs affected	Likelihood	Severity	Risk level	Proposed mitigation measures	Responsible partner(s) for mitigating risk
1		Validity of the research model.	The model tested may have a low validity (validity of the dependent variables).	WP4, WP6	Low	Medium	Low	UNL will build the research model based on an extensive literature review, as well as resorting to qualitative data collection (interviews to experts and consumers).	UNL, TH OWL
2		Lessened impact of outcomes.	Failure to replicate/scale up solutions across pilots.	WP10	Low	Medium	Low	Building interoperable features; open communication of learning; homogenisation of process and economies of scale.	UoP, UNIVBRIS
3		Commercialisation priorities.	Broader economic impacts hinder energy related commercialisation, access to market or support.	WP10, WP11	Medium	Medium	Medium	Contextualisation and demonstration of the relevance of UCs for the post-pandemic economy and cities.	UNIVBRIS, UoP, WEC, smartEN, IFC
4		Usability of the Tool	Uptake and exploitation of the final TwinERGY Platform is poor as a result of the platform not being intuitive to use or fit for purpose.	All	Low	High	Medium	Stakeholder engagement is a key component of the project. Stakeholder feedback will be used to ensure that the final platform is fit for purpose, easy to use and offers the functionality required. IES will engage their UX/UI designers to ensure that the final modules being developed by IES are fit for purpose and easily used.	All Partners
5	<b>Exploitation risks</b>	Lessened impact of outcomes.	The project fails to address the requirements of the industry.	WP2, WP10, WP11	Low	Low	Low	TwinERGY aims to incorporate in its design the requirements of the industrial partners to support the development of secure and reliable solutions. The industrial partners will be key developers of the TwinERGY framework and the coordination of TwinERGY activities with a list of other EU initiatives will ensure that TwinERGY will meet the industrial requirements in a satisfactory way	WEC, UoP, UNIVBRIS, BENETUTTI, MYTILINEOS, BCC, Stadt Steinheim
6		Standardisation issues.	Not enough support to standardization activities inside the project.	WP12	Low	Low	Low	The leader of the standardization task will utilize its network of contacts in the industry in order to reach a broad knowledge of the standardization activities and to form an interest group that provides active support. All participants are asked to contribute with their network of contacts in this forming of an interest group.	All Partners
7		Business models selection.	Selection of business models with low stakeholder acceptance.	WP2, WP10, WP11, WP12	Medium	Medium	Medium	Use a participatory approach involving all stakeholders to identify the best viable business models at project start. Direct discussion with the community to select the scenario that best represent stakeholders' objectives.	WEC, UNL, UoP, STAM, TH OWL, KWMC, IFC, BENETUTTI, MYTILINEOS, BCC, Stadt Steinheim