

Deliverable D1.1

Quality Assurance and Risk Management Plan

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D1.1 Quality Assessment and Risk Management Plan

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List of Acronyms

Terminology/ Acronym	Description
3C	Cross-cutting Committee
AAI	Authentication and Authorization Infrastructure
CA	Consortium agreement
DMP	Data Management Plan
DoA	Description of Action



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Terminology/ Acronym	Description
EB	Executive Board
EC	European Commission
EOSC	European Open Science Cloud
ES	Earth System
ERIC	European Research Infrastructure Consortium
ESFRI	European Strategy Forum on Research Infrastructures
EU	European Union
FAIR	Findable Accessible Interoperable Reusable
FSIGN	Financial Signatory, Legal Signatory
GA	Grant Agreement to the project
GA	General Assembly
GDPR	General Data Protection Regulation
IPR	Intellectual Property Right
KPI	Key Performance Indicator
MD	Molecular dynamics
MS	Milestones
OPERAS	Open scholarly communication in the european research area for social sciences and humanities
PCO	Project Coordination Office
PID	Persistent Identifiers
PO	Project Officer
RDA	Research Data Alliance
RP	Reporting Period
SDC	Scientific Domain Committee
SSH	Social Sciences and Humanities
SWOT	Strengths, Weaknesses, Opportunities, Threats
TC	Technical Committee
WP	Work Package

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Executive Summary

This deliverable is the first report of the LUMEN project. It sets out a clear framework for coordinating the project and provides a comprehensive assessment of the risks identified after two months of running the project.

The LUMEN project brings together 20 organisations from 10 different countries, involving around 90 people. Its main objective is to enhance cross-disciplinary collaboration by improving two existing platforms and developing two new ones **through the creation of a White Label software system. This system will be designed for reuse, enabling the creation of Discovery Platforms for various scientific domains, ensuring adaptability and scalability. All four platforms will be integrated within a federated and interoperable Data Mesh architecture, allowing researchers across different disciplines to seamlessly access, share, and enrich research data and outputs. By bringing together domain-specific communities and technical partners, LUMEN aims to create a sustainable, scalable ecosystem that fosters interoperability, openness, and cross-domain knowledge exchange.**

A key challenge for LUMEN is to ensure the effective uptake of the tools developed. In particular, the project partners will work to ensure compatibility with EOSC, the long-term sustainability of the business model and effective communication with the scientific community.

This deliverable clarifies the project governance structure, project resources and quality assessment processes. It includes a detailed risk analysis and outlines measures to mitigate potential problems.

Annexed to this deliverable is the Project Handbook, which describes the communication channels, information sharing methods and procedures for publishing deliverables and milestones, as well as the organisation for regular reporting of each partner's activities. The appendices also contain the detailed list of risks identified for the project.

To achieve these results, the team has drawn on best practices from existing European projects and adapted them to the specific context of the project. Input has been sought from the WP leaders and the technical and scientific coordination teams to ensure that the document reflects the diverse needs of the project.

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Introduction

This deliverable, part of WP1 "Management, Coordination and Synchronisation" of the LUMEN project, provides a comprehensive overview of the project structure and establishes a framework for quality assessment and risk management from the outset.

Two months into the project, the document examines strategies for effective coordination within the LUMEN decentralised European consortium. In particular, the deliverable looks at how to ensure a smooth and effective flow of information between 20 organisations in 10 countries - bringing together around 90 professionals. The deliverable also explores methods for harmonising the interdependent development activities of different teams, emphasising agile coordination as a cornerstone of the digital development of the four innovative platforms for accessing and re-using research data.

The management and governance of LUMEN presents unique challenges due to its transversal structure. Interdependent partners work together without a rigid hierarchy, relying instead on mutual commitment and a shared goal of success. In this context, non-compliance threatens partners primarily through the potential loss of funding and reputational impact, rather than through hierarchical sanctions.

As the results of a WP can significantly influence the progress of others, effective coordination is essential. This need is further emphasised by the fact that the project aims to serve four different scientific domains - Mathematics, Molecular Dynamic, Earth System and Social Sciences and Humanities - which require seamless exchange of information to avoid siloed development and ensure integrated, functional solutions.

Externally, as an EOSC project, LUMEN needs to align its development with the evolving EOSC processes. In addition, the long-term sustainability of the tools depends on the establishment of a robust business model. Although the project is funded by the EU for three years, it is expected to achieve operational autonomy thereafter. To ensure the practical uptake and continued usefulness of the tools developed, a comprehensive communication strategy will also be sought to effectively reach and engage the wider research community.

In summary, this deliverable outlines the organisational framework for the LUMEN project, addresses its quality assessment, assesses the potential risks and provides a preliminary analysis of strategies to mitigate these challenges.

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1. Project management structure

1.1 Principles

The LUMEN project aims to involve four scientific communities - earth system, molecular dynamics, mathematics and social sciences and humanities (SSH) - in the EOSC initiative. Its dual mission is to support these communities in structuring and opening up their research, while providing them with innovative tools for sharing, analysing and consolidating their results. To achieve this, LUMEN brings together public and private efforts to improve existing solutions, such as the GoTriple platform for SSH, and to develop equivalent tools tailored to the needs of the other disciplines involved.

The success of LUMEN depends on a wide range of expertise, with input from representatives of the participating scientific domains (WP3) essential to ensure that the tools and solutions are tailored to their specific needs. The project also involves significant technical development (WP2, WP4, WP5, WP6). Ultimately, LUMEN aims to comply with EOSC standards to ensure seamless integration into the wider EOSC ecosystem (WP5), and places a strong emphasis on improving the user experience through the creation of innovative tools and enhanced services for researchers (WP6).

Given the complexity and decentralised nature of the consortium, trust, respect, accountability and clear communication are fundamental to maintaining engagement and cohesion.

To this end, the consortium shall remain an open space for dialogue, where participants feel empowered to ask questions, express concerns and share insights, thereby avoiding the formation of silos. In this context, the PCO plays a crucial role in fostering collaboration by organising discussion spaces and ensuring that no participant is left behind. The governance model has been designed to encourage cross-disciplinary engagement through thematic groups focused on technical development and scientific domains, with a technical coordinator bridging these groups to ensure a smooth flow of information.

In parallel, the PCO is responsible for providing tools to facilitate interaction, sharing of documentation and direct communication on current developments. All leading stakeholders have been consulted to assess potential risks and develop appropriate mitigation strategies. Each identified risk is assigned to a leader who will monitor and address it throughout the three years of the project, ensuring that each component contributes effectively to the overall success of LUMEN.

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1.2 Management structure

The governance of LUMEN is organised in such a way as to ensure the circulation of information between the different working groups of the project.

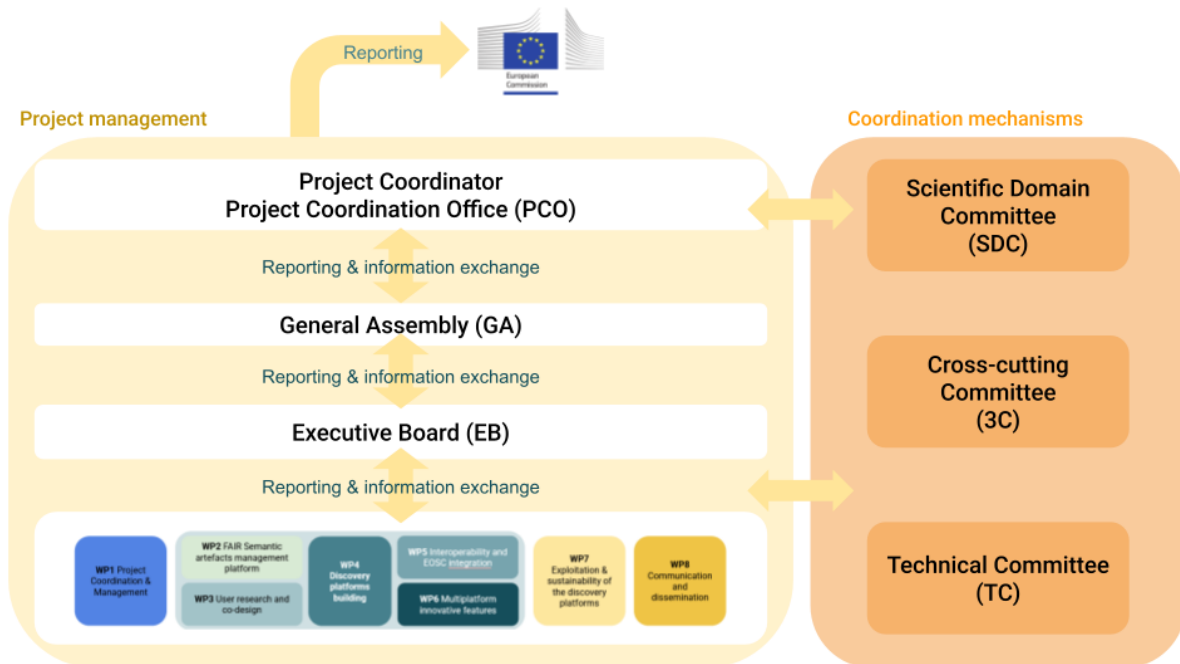


Figure #1: LUMEN governance and structure

1.2.1 Project Coordination Office (PCO)

Project Coordination Office (PCO)	
Participants	Project coordinator + Project manager + Technical coordinator + one representative from OPERAS ¹
Meeting frequency	Bi-weekly meeting
Responsibilities	Support WP leaders / Review reports / Monitor the compliance of beneficiaries with their obligations / Inform the PO at the EC / Control and update work plan / Internal communication / Organisation of GA and EB meetings / Adapting management strategies

¹Go Triple is a managed service OPERAS

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1.2.2 General Assembly (GA)

General Assembly (GA)	
Participants	At least one representative per partner of the consortium
Meeting frequency	Once a year
Responsibilities	Conflict resolution / Report on progress and to agree remedial action, based on advice from the EB, if milestones are missed or deliverables are not released on time.
Voting and veto	<p>Consensus first:</p> <ul style="list-style-type: none"> • The General Assembly (GA) aims to reach decisions by consensus. • If consensus isn't possible, a vote will be taken, with each partner having one vote and a two-thirds majority required for a decision. <p>Executive Board (EB) voting:</p> <ul style="list-style-type: none"> • Any EB member can call for a vote. • At least two-thirds of the members of the EB must be present or represented for any decision to be valid. <p>Written (No-Meeting) decisions: decisions can be taken without a meeting if the coordinator sends a written proposal with a deadline for responses.</p> <p>Decisions requiring unanimity (by GA present/represented):</p> <ul style="list-style-type: none"> • Adding a new party to the consortium. • Removing a participant who is not meeting their obligations. • Granting a participant the mandate to represent the consortium to third parties. <p>Veto rights:</p> <ul style="list-style-type: none"> • Any member significantly affected by a decision (in terms of work, timeline, costs, liabilities, intellectual property, etc.) can veto all or part of that decision. • When the decision is pre-listed on the agenda: veto must be exercised during the meeting. • When the decision is added during the meeting: veto can be exercised during the meeting or within 15 days after the meeting minutes are circulated.



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	Resolving a Veto: If a veto is issued, the consortium must work together to resolve the concerns and find a solution acceptable to everyone involved.
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1.2.3 Executive Board (EB)

Executive Board (EB)	
Participants	All WP leaders + PCO + Technical coordinator
Meeting frequency	Meetings are held every two months and a written update is required in the month when no meeting is scheduled.
Responsibilities	Implementing the work plan / Ensuring the timely and high-quality delivery of outputs / Addressing any issues that arise through corrective measures / Securing the project's overall success, visibility, and sustainability.

1.2.4 Technical Committee (TC)

Technical Committee (TC)	
Participants	Technical coordinator + WP2 + WP4 + WP5 + WP6 + eventually WP3
Meeting frequency	Monthly meetings
Responsibilities	Ensure the visibility and interoperability of the platform / Foster cross-cutting issues

1.2.5 Scientific Domain Committee (SDC)

Scientific Domain Committee (SDC)	
Participants	Representatives from each scientific domain involved in the LUMEN project (SSH, Maths, ES, and MD) + PCO + Technical coordinator
Meeting frequency	Monthly meetings
Responsibilities	Identify and address the specific needs of these communities by organising workshops or consultations, testing the developed services, and evaluating the quality of

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	the outcomes against the distinct requirements of each domain.
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1.2.6 Cross-Cutting Committee (3C)

Cross-cutting Committee (3C)	
Participants	EB + SDC
Meeting frequency	SDC joins the EB every 4 months.
Responsibilities	To provide updates and collaboratively address specific issues requiring a collective approach.

1.2.7 WP Leaders (WP Leaders)

WP (WP) Leaders	
Participants	All WP leaders
Meeting frequency	Frequency of meetings for WPs and possibly tasks is at the discretion of the WP and Task Leaders according to identified needs.
Responsibilities	Manage their respective WPs and distribute tasks to the different organisations involved / ensure that milestones and deliverables of their WP are delivered on time.

2. Resources and quality assessment

The LUMEN project is constrained by three key components: its budget, its deadlines and the expected quality. The quality assessment in the LUMEN project involves a systematic evaluation of the deliverables, software and other project outputs. It refers to the time, machines, budget and people involved in the project.

2.1 LUMEN, contract charter

The **LUMEN Contract Charter**—which outlines the project’s purpose, expected outcomes, deliverables, impact, roles, and communication tools—**corresponds to the Grant Agreement issued by the Commission** and signed by the partners at the start of the project. It sets out both the regulations governing this type of project and the

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eligibility criteria for funding. In addition, it provides a description of the various project WPs, complete with dates, sub-objectives, deliverables, and designated roles.

2.2 LUMEN, resources and constraints

The LUMEN project has four types of resources:

Financial: the LUMEN project has a budget of approximately €7 million, of which 76% comprises expenditure on human resources. Only 2% is allocated to travel and 2% to other expenses, such as the acquisition of software or IT equipment. The remaining 20% consists of indirect costs, which the organisations may allocate at their discretion, although these are normally attributed to support functions necessary for the project's operation. **The budget is inflexible** in this sense and will not be increased by the European Commission. Any potential flexibility lies solely in the internal allocation of funds within the consortium. Depending on the expertise, capacity and skills of each partner - as well as the evolution of the project in the coming years - the budget can be reallocated between the project partners if this helps to achieve the objectives. However, such a change requires an amendment from the European Commission, which involves additional administrative and financial investment by both the partners and the coordinator.

Time: the project's execution works in a similar way to the budget, as the three-year duration of the project is set by the European Commission, leaving very little room for manoeuvre. Throughout these three years, deliverables and milestones are clearly defined in the Grant Agreement and serve as internal deadlines for the project. However, there is some flexibility in the sense that deadlines can be postponed on condition that the relevant tasks will be completed within the same reporting period. In the event of a delay, it is essential to review the interdependencies with other project tasks. In addition, any deviations must be explained to the European Commission during the six-month financial and administrative reporting.

Human: in terms of person-months, the LUMEN project has, on paper, brought together 25 full-time individuals over three years. In practice, this amounts to 923 person-months, spread across approximately 90 people over three years. The LUMEN project brings together a wide range of skills: developers, researchers, project managers, coordinators, product owners, semantic interoperability specialists, communications managers, administrative managers, etc. One of the project's

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challenges is to enable all these stakeholders to cooperate and to allow their skills to complement one another.

Technical: the LUMEN project is primarily focused on developing IT platforms. To this end, the project requires computers, dedicated servers, development software (both frontend and backend), databases, etc. These technical tools are not shared at the project level but rather at the level of the partner organisation responsible for the task.

2.3 LUMEN, quality assessment

The LUMEN project has three main objectives. The first is to improve existing platforms by refining the GoTriple platform and upgrading that of the Centre Mersenne. The second is to develop two new platforms: one dedicated to the Earth system and another to molecular dynamics. The third is to develop an empty, reusable platform that provides an adaptable solution for other scientific disciplines to manage and share their data.

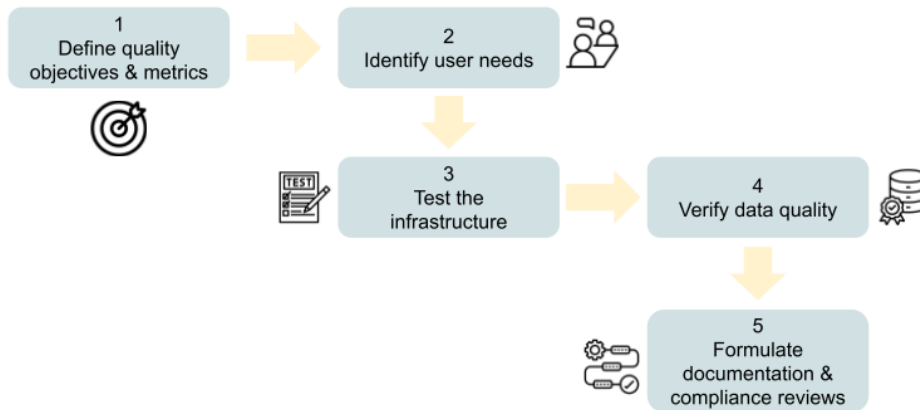
The expected quality is the area with the greatest degree of flexibility, as the project is partly research oriented. Although there are clear objectives and a strong commitment to achieving them, the project is developing prototypes whose success depends on the dynamic interaction between different stakeholders and the ability to build communities. Uncertainty is inherent in this type of endeavour and if it cannot be demonstrated that every effort has been made to achieve the objectives, the European Commission may impose financial penalties.

From a technical perspective, particular emphasis will be placed on interoperability and adherence to the FAIR principles, both in the software and in other outputs such as ontologies. This approach will facilitate seamless integration across disciplines and with the EOSC.

Key quality and performance metrics, including robustness, data accuracy, security and usability, will be rigorously assessed through testing, validation protocols and stakeholder feedback. Continuous monitoring, benchmarking against industry standards and iterative improvements will enhance the functionality of the platform, ensuring that it meets the needs of researchers, developers and end-users as it progresses towards higher TRL levels.

In the context of the LUMEN Data Mesh, quality assessment will be adapted to the decentralised and federated nature of the ecosystem, with each community managing and publishing its own data products and assessments, tailored to the different maturity levels of the components as defined in the WP4 and WP6 roadmaps.

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Figure#2: LUMEN - quality assessment process

2.3.1 Define quality objectives & metrics

Prior to conducting the assessments, the project will establish clear quality objectives that are aligned with the overall project requirements. This will include:

- **Functionality:** ensuring that core functionality meets user expectations.
- **Interoperability:** compatibility across different scientific domains, project components and systems.
- **Data quality:** adherence to FAIR principles ; reliable and consistent processing of data sources.
- **Security & Compliance:** compliance with GDPR, cybersecurity and ethical guidelines.
- **Usability:** ease of use, accessibility, reasonable response times and intuitive design.
- Compliance with **community defined data contracts:** each data product must adhere to the structure, quality, and semantics described in its respective data contract.

2.3.2 Stakeholder & end-user feedback

WP3 is tasked with identifying user needs through interviews focused on the identified scientific domains, while the SDC - composed of representatives from each of the four scientific domains - will also contribute to the identification and evaluation of these criteria. Ultimately, these benchmarks will facilitate an objective assessment of the success of the project and highlight areas for improvement to ensure that the diverse expectations of users are met.

User involvement comprises the following actions:

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- **User involvement in design-testing & surveys:** gather feedback from researchers, developers and policy makers.
- **Pilot deployments:** test the enhanced platform in real research environments before full implementation.
- **Agile iterations:** implement improvements based on stakeholder input and test results.
- **Federated data sharing governance:** validation of community-contributed data products will involve relevant domain teams, coordinated by the Federated Data Sharing Governance Body, to ensure that domain-relevant quality expectations are met.

2.3.3 Implement a rigorous testing framework

Multiple testing approaches are used to systematically assess quality:

- **Unit testing:** validate individual components of the platform (e.g. API endpoints, data processing algorithms).
- **Integration testing:** verify that the enhanced functionality works smoothly with the existing system and between interoperable services.
- **System testing:** evaluate the entire platform under real-world conditions (real research environments).
- **Load & stress testing:** ensure system stability under high data volumes and concurrent users.
- **Security & penetration testing:** identify vulnerabilities and ensure data protection.

2.3.4 Validate data & interoperability standards

As the platform integrates multiple scientific domains, the focus is on:

- **Data integrity checks:** verify the accuracy, consistency and completeness of data sets.
- **Metadata validation:** ensure compliance with standards such as Dublin Core, ISO 19115 or schema.org for metadata interoperability.
- **Semantic interoperability:** use ontologies and controlled vocabularies to improve data exchange across domains. Semantic interoperability: ensure cross-domain alignment through ontologies, controlled vocabularies and the LUMEN metamodel. Data contracts define the structure and semantics for each data product, while the FAIR Semantic Management Space supports progressive harmonisation across communities.
- **API Interoperability:** use standard protocols and open data formats to expose platform data and access services.

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2.3.5 Documentation & compliance review

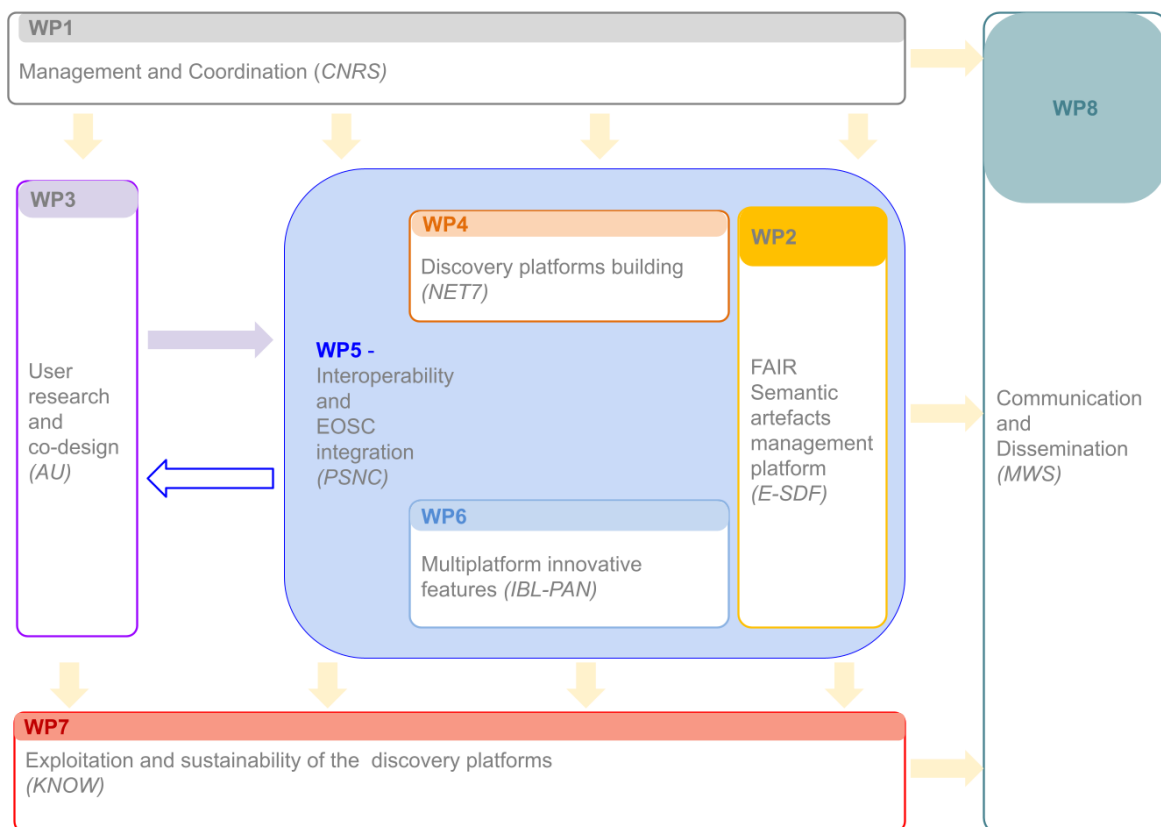
Maintain transparency and facilitate future upgrades:

- **Technical documentation:** maintain clear and public records of software architecture, APIs and data models.
- **Regulatory compliance reports:** ensure compliance with EC guidelines and ethical standards.
- **Quality assurance reports:** document findings from QA processes and propose corrective actions.

By following these structured steps, the project will effectively enhance the GoTriple and White Label Discovery platform, ensure high quality outputs and progress towards a higher TRL with confidence in technical robustness, data integrity and user acceptance.

3. Risk management plan

3.1 LUMEN, WP interdependencies



Figure#3: LUMEN - structuration of WPs

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The LUMEN WPs are interdependent due to the nature of the project, which is decentralised but with a shared objective. Each WP is responsible for a different component of the project.

WP1, WP7 and WP8 function as overarching WPs that play a cross-cutting role throughout the project lifecycle. WP1 provides the basic framework for the project and ensures internal communication and coordination, while WP8 ensures efficient and effective communication and dissemination of results to relevant stakeholders. WP7 focuses on the exploitation and long-term sustainability of the federated discovery ecosystem, ensuring that the Data Mesh principles remain viable beyond the project's duration. **They all need information from the other WPs in order to coordinate the project, disseminate relevant information and plan a sustainable model for the project.**

At the heart of the project are the technical WPs, WP4 and WP6, which are tasked with developing the core digital infrastructure of the Data Mesh, including discovery platforms, AI-powered services, and interoperability layers. These WPs rely on critical contributions from WP2, which provides the FAIR Semantic Management Space to enhance data discoverability and interoperability, and WP3, which collects and analyses user needs and expectations. The Data Mesh approach requires strong collaboration and continuous feedback loops between these WPs to ensure that tools and services are not only technically robust but also domain-adaptable, scalable, and truly federated.

WP5 plays a central role as a bridge to the wider European context by connecting LUMEN to the EOSC ecosystem. This WP ensures the alignment with European tools and services, which requires continuous engagement, in particular for the integration of EOSC core services. These include AAI, persistent identifiers (PIDs), monitoring and accounting systems and helpdesk support. Such alignment is essential to ensure that LUMEN remains fully compatible with and integrated into the wider EOSC framework. This WP will have a particular influence on WP7, as the future of the project is linked to the future of the EOSC. At the same time, the technical WPs will need to be kept informed of EOSC developments in order to develop interoperable technical tools

3.2 LUMEN, Strengths, Weaknesses, Opportunities, Threats (SWOT)²

LUMEN benefits from a highly experienced team, with **several members having previously contributed to the development of GoTriple**, a key source of inspiration for this initiative. This continuity ensures a solid base of expertise and lessons learned, facilitating a smoother implementation process. The project also thrives in a **positive and collaborative consortium atmosphere**, fostering cohesion and a constructive

² detailed table in Annex C

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working environment that promotes collaboration between partners. In addition, **LUMEN adopts a multidisciplinary and inclusive approach**, bringing together four different scientific communities. This diversity fosters interdisciplinary synergy and a rich exchange of perspectives, strengthening the overall impact of the project.

By integrating existing solutions with tailored development, **LUMEN builds on proven tools** such as the GoTriple platform, while developing equivalent solutions for other disciplines. This strategy maximises efficiency and increases relevance to different scientific domains. The project's governance and organisational structure are also key strengths, with clearly defined WP and well-defined responsibilities allowing for effective coordination and management. In addition, **a strong emphasis on usability and FAIR compliance is embedded in the project structure**, with WP3 and the SDC dedicated to addressing community needs and ensuring usability.

Despite these strengths, the project faces internal challenges, in particular due to its **decentralised stakeholder base**. The involvement of multiple actors from different institutions and countries adds complexity to coordination and decision-making. **Language barriers and differences in terminology** can also create difficulties in communication and knowledge sharing, potentially slowing down progress. In addition, LUMEN relies on the commitment of the scientific community and public-private partnerships to be successful. **Any misalignment or delay in gathering community needs could create significant obstacles**. The ambitious scope of the project and the associated technological challenges add to the complexity, as the **development and integration of several innovative tools in a European framework requires overcoming interoperability issues** and ensuring compliance with EOSC standards. In addition, **resistance to change in some communities** could hamper adoption, particularly where new tools and workflows require significant changes from established practices.

Externally, LUMEN is well positioned to take advantage of several key opportunities. Its alignment with the EOSC initiative ensures integration with core European services such as AAI, PIDs, and monitoring systems. This strategic positioning strengthens the project's credibility and enhances its potential for long-term impact. Furthermore, **LUMEN contributes to the broader movement towards open science** and FAIR data, reinforcing transparency, accessibility, and collaboration in research. In doing so, it has the **potential to act as a catalyst for open scientific practices across disciplines**.



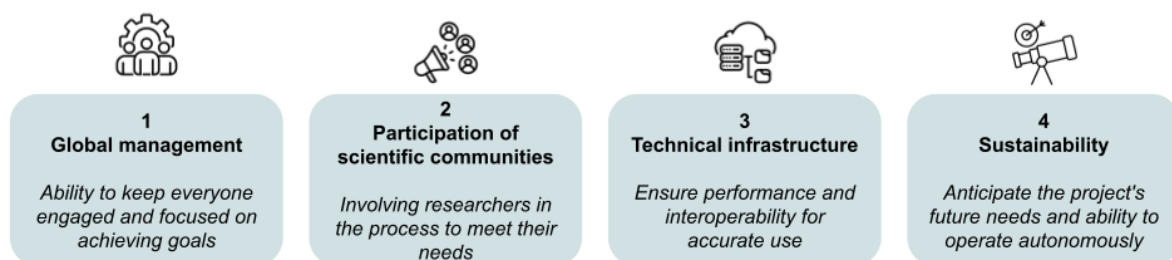
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The project also presents an opportunity to **establish new standards and good practices in data management and interoperability**, potentially serving as a reference model for international initiatives. By involving stakeholders from both the public and private sectors, **LUMEN fosters synergies and extends research networks**, encouraging strategic partnerships that can extend its reach. Another important benefit is the **potential to develop sustainable business models** that ensure the continued use of the tools developed beyond the initial funding period. Successful commercial or institutional adoption of these solutions could ensure long-term sustainability and impact.

However, LUMEN faces several external threats. The project's reliance on emerging technologies introduces **uncertainties in terms of reliability and scalability**, as innovation in this area often presents unpredictable challenges. The rapid evolution of digital research infrastructures and information technologies also poses a risk, as solutions may become obsolete if the project fails to adapt quickly to market developments. In addition, the funding horizon 2027 is a critical milestone; **without continued financial or institutional support beyond this point, the sustainability of the tools and platforms developed could be at risk**. Finally, **competition from parallel initiatives, both within Europe and internationally, may affect LUMEN's visibility and long-term impact**. Other projects developing similar solutions could divert attention and resources, requiring a proactive strategy to differentiate LUMEN and ensure its continued relevance in the research landscape.

3.3 LUMEN, risks identified and mitigations measures

The risks associated with the LUMEN project can be categorised into four primary resource groups: Global management, participation of scientific communities, technical infrastructure and sustainability. Each category presents significant challenges that, if not properly managed, could seriously jeopardise the success of the project. All risks listed as part of LUMEN are considered to be manageable. The detailed risk description is within Appendix D.



Figure#4: LUMEN - Identification of 4 risk categories

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3.3.1 Global management

Risks identified: LUMEN faces short-term risks related to global management, which are primarily monitored by WP1. In addition, WP3 and WP7 are linked to two of the eight risks identified in this area. These risks are largely dependent on the planning and synchronisation of the tasks in the project. This highlights the need for clear communication of procedures, budgets and task dependencies to ensure effective management.

Mitigation measures proposed: internal reporting will be required every six months to monitor project development and ensure correct implementation. To maintain flexibility, the PCO allows amendments and budget transfers based on project needs. WP leaders, the PCO, and the technical coordinator will meet regularly to facilitate the exchange of information, and the PCO will participate in LUMEN project meetings and committees whenever possible to stay informed.

The use of Mattermost³ enables easy communication across the project consortium, including with the PCO. At the start of the project, a GANTT chart was developed to map out task dependencies. Additionally, before the project began, a management sheet was deployed within each WP folder to clarify tasks and associated responsibilities. To further strengthen technical coordination across WPs, a Technical Committee Dependency Board has been proposed to provide a high-level view of cross-WP technical dependencies. This board will help monitor interdependencies, anticipate risks, and ensure centralised visibility of key interactions without adding overhead.

To engage the consortium, existing networks such as EOSC and ESFRI communities can be leveraged, alongside a proactive engagement approach. Regarding data management, the DMP will be reviewed by all WP leaders throughout the project to ensure its effectiveness.

In charge: WP1 Lead; Technical coordinator; WP7 Lead; WP3 Lead

3.3.2 Participation of scientific communities

Risks identified: another critical risk concerns the ongoing involvement of scientific communities throughout the project. Managing the diverse needs of these communities while ensuring interoperability –particularly semantic interoperability– poses a significant challenge. Each domain must adopt the FAIR principles, and integrate the tools developed within their workflows. On a day-to-day basis, regular feedback (interviews, use cases) from scientific domains is essential to ensure that

³ See Annex A - project handbook

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the tools meet their needs and remain relevant. At the same time, scientific communities will have to adopt the new tools developed. This challenge extends across short, medium, and long-term project phases.

Mitigation measures proposed: the **Lens Matrix** will be used to understand the scientific communities expectations, while interviews conducted by WP3 will provide further insights. **Regular feedback** will be actively sought from these communities to ensure that progress remains aligned with their needs. **Workshops** will be organised in order to engage the communities in the very first stages of development and the tools will be tested with some of their representatives. Representatives from all four scientific domains covered by the project will be involved in WP8 to help **target communication campaigns** and ensure that the tools developed are widely recognised within their fields.

The SDC, which brings together all the scientific domain representatives, will meet monthly to keep members informed. The Technical Coordinator will attend these meetings to bridge the gap between technical development and community needs. In addition, the committee will meet every four months with the EB - which includes WP representatives and the PCO - to maintain overall alignment across the project. These measures are designed to ensure smooth communication throughout the project's development.

Concrete and practical use cases will be planned and developed to demonstrate the impact of the project and attract potential users. Key stakeholders will be identified at the outset to act as influential leaders and engage communities in the newly developed platforms. Early adopters will also be involved to showcase successful use cases and encourage wider adoption.

To ensure the quality of shared data, **interoperability guidelines will be established from the outset**. To ensure the quality of shared data, interoperability guidelines will be established from the outset. Rather than focusing solely on raw data integration, LUMEN will collaboratively identify and structure **Data Products** that provide real value across disciplines. Each community will contribute to defining **which datasets, metadata, and semantic resources are suitable for integration**, ensuring that these Data Products are aligned with the needs of both their domain and the broader federated ecosystem. To formalise and maintain these Data Products, **Data Contracts** will be introduced as structured agreements defining their **scope, expected structure, access policies, and interoperability requirements**. These contracts will play a key role in ensuring that Data Products remain **FAIR, reusable, and aligned with LUMEN's federated governance model**. For communities that are less mature in this area, a minimum viable Contract model will be proposed, accompanied by a regular monitoring process to track progress as they integrate into the data mesh. Cross-community validation checkpoints will be implemented to ensure consistency in ontologies and taxonomies, while early guidance will be provided to help scientific communities structure their Data Products effectively. In addition, comprehensive

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training and **clear documentation will support the adoption of the FAIR Semantic Management Space**, ensuring that all communities can engage with LUMEN's ecosystem at their own pace.

In charge: WP1 Lead; WP2 Lead; WP3 Lead; WP4 Lead; WP8 Lead

+ Scientific & Technical coordinators

3.3.3 Technical infrastructure

Risk identified: a major category of risk relates to the technical infrastructure and primarily affects the Technical Committee and members of WP2, WP3, WP4, WP5 and WP6. These risks all relate to ensuring that the various systems work together effectively as they are developed. Within this broad category, several specific sub-categories have been identified.

One risk relates to the **coordination between user needs and the practical development of the platform**. There is a possibility that user requirements gathered through co-design processes may become overly complex. In addition, some research communities are more advanced than others in terms of data sharing, which could lead to unequal outcomes for different user groups.

The quality of FAIR data is a potential risk, as the interdisciplinary metasearch system relies on structured metadata and API access to federated platforms. If data is missing or inconsistent, the overall effectiveness of the system could be compromised.

Risks associated with **innovation** tools include the ability of systems to handle the high computational demands of large datasets, potential errors in the automated extraction of data for the software catalogue, and the possibility of inaccurate chatbot responses. Another challenge is to ensure that the technical capabilities of the platform match the real needs of its users.

Interoperability is a critical aspect of the project and presents its own challenges. LUMEN brings together several scientific domains, each with varying degrees of internal interoperability, or in some cases none at all. The structural differences in how data is organised across these communities further complicates their integration into the platform. In addition, LUMEN developments will not start from scratch, so existing technologies will need to be taken into account. Ensuring that new platforms work smoothly with external systems adds another layer of complexity. At the back-end, these platforms will also need to be interoperable with the evolving EOSC framework, which is still under development.

Beyond the technical challenges, organisational interoperability is another concern.

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The business processes of the different organisations involved in LUMEN are very different, which can affect collaboration and workflow integration.

Finally, there is a risk that the generalisation and abstraction of the GoTriple software component may prove difficult, potentially complicating the successful implementation of the white label platform.

Mitigation measures proposed: to maintain strong engagement with the scientific communities, a continuous dialogue will be established between user research, co-design activities and partners responsible for the development of graphical user interfaces. In addition, the technical team will ensure that developments are aligned with the maturity level of each community, fostering inclusive participation.

Clear metadata and API requirements need to be defined in line with WP4 and WP2. Data shared on the platforms should be properly structured and continuously validated in coordination with the Federated Shared Data Governance.

The **Federated Shared Data Governance** will play a central role in ensuring consistency and alignment across data providers and communities. Data Contracts will define clear exchange rules, helping to structure interoperability between diverse scientific domains while ensuring compliance with FAIR principles. Data Quality Policies will provide continuous assessment mechanisms to monitor and improve metadata consistency, while the Federated Data Catalog will facilitate the discoverability and reusability of datasets across the LUMEN ecosystem. Together, these elements will ensure that interoperability is not only achieved at the technical level but is also embedded in a structured governance framework, reducing risks related to fragmented data structures and heterogeneous metadata practices.

Fallback mechanisms will be implemented to handle missing metadata and ensure robust query performance. In order to fully exploit FAIR data and support interoperability between different communities, **regular communication with use case providers** will help to maintain compliance with design specifications and requirements. All members of the technical working group will need to have a good understanding of the features delivered by WP4 in order to effectively expose reusable services. System integration will be validated through API compatibility testing.

There are several risks to managing innovation tools. Visualisation tools may require significant computing resources, so pre-release testing is essential. The software catalogue may be subject to errors when automatically extracting data from different repositories, which will be mitigated by regular metadata quality checks. For chatbots, inaccuracies in responses are a concern and human oversight will be required, along

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with mechanisms for users to report errors for continuous improvement. In addition, visualisation tools may not be fully aligned with researchers' workflows, requiring iterative testing and refinement with end users. Clear documentation and training will be provided to support adoption.

Training of AI models requires access to sufficient annotated datasets, and continuous evaluation and refinement of AI-based automation will be conducted based on community feedback. A manual fallback mechanism will be maintained to correct and improve AI outputs. The metamodel will be carefully designed to ensure data interoperability within the data network. The teams responsible for the design of the model will also be involved in the implementation of the Data Grid architecture, reducing the risk of miscommunication or misalignment of objectives. In addition, the technologies developed must remain compatible. As all LUMEN partners come from similar networks (RDA, EOSC-A, ERIC, etc.), they share a common culture of innovation in tool development, which will help streamline collaboration.

Early engagement with EOSC Core teams will allow LUMEN to anticipate integration requirements and ensure interoperability between EOSC Core and LUMEN services. Technical feasibility assessments will be conducted prior to onboarding EOSC services to minimise potential integration challenges.

A final technical risk relates to difficulties in generalising and abstracting the GoTriple software components for effective implementation of the white label platform. However, the consortium itself represents a key mitigation measure, as it includes the main partners responsible for the original implementation of these components. Their involvement will reduce the ramp-up time required for technical refactoring throughout the project.

In charge: WP2 Lead; WP3 Lead; WP4 Lead; WP5 Lead; WP6 Lead; Technical coordinator

3.3.4 Sustainability

Risk identified: the failure to ensure sustainability is one of the key risks for the LUMEN project and will be primarily addressed by WP7. This risk includes the challenge of defining a sustainable business model that ensures long-term financial viability, establishing a governance framework in line with EOSC principles, and adapting to market developments. In addition, the project will need to address scalability and deployment challenges, as well as potential conflicts related to intellectual property rights. Another related risk concerns the integration of LUMEN into the EOSC framework, which requires careful coordination and technical compatibility to ensure a seamless fit.

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Mitigation measures proposed: to ensure the sustainability of the platforms developed under LUMEN, several mitigation measures are planned. Exploitation strategies will be shaped through continuous dialogue with communities, drawing on the experience of EOSC stakeholders. Several exploitation scenarios will be explored and validated through stakeholder workshops, and institutional champions will be identified within the relevant communities. A key principle of the business model will be its flexibility to adapt to the evolving needs of the communities.

In order to avoid reinventing the wheel, the project team will study existing solutions and governance structures in the EOSC context, thereby benefiting from established good practices. To reinforce sustainability and interoperability beyond the duration of the project, LUMEN will leverage the Shared Data Governance Platform. The adoption of Data Contracts will establish clear rules for data exchanges, ensuring not only compliance with EOSC governance principles but also broader interoperability across Open Science infrastructures and scientific communities. Additionally, Data Quality Policies and a federated Data Catalog will facilitate the long-term integration and reuse of data, strengthening the project's alignment with FAIR principles. These governance mechanisms will provide a structured framework to support scalable and sustainable data-sharing practices across disciplines.

Clear IPR agreements will be established early in the project, with regular opportunities for review. To build and maintain a user community, key stakeholders will be involved from the outset, supported by comprehensive documentation and a series of engagement workshops.

LUMEN project members will maintain close contact with the EOSC Board, with WP5 specifically responsible for liaising with EOSC. They will closely monitor future developments within EOSC to ensure that the LUMEN tools are designed in line with its evolving framework. In addition, to address scalability and deployment challenges, the cloud infrastructure will be stress-tested prior to deployment to ensure that cloud orchestration remains flexible.

In charge: Technical coordinator; WP5 Lead; WP7 Lead; WP8 Lead



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Conclusion

The aim of this deliverable is to identify the practical means of implementing the project as a whole, thereby ensuring that its objectives are met. In a context characterised by strong dependencies between the various partners, the focus is on streamlining communication and creating an IT and team environment that facilitates timely exchanges.

At the same time, the deliverable positions the LUMEN project in its broader context through a SWOT analysis that examines internal strengths and weaknesses as well as external opportunities and threats. It then identifies the project's room for manoeuvre. Given that time and budget are constrained by the contract binding the partners and the European Commission, the primary lever for adjustment is the quality of the outputs. This in turn depends on the ability to demonstrate that every effort has been made to deliver a result that meets expectations.

Finally, the deliverable examines the risks associated with the project by distinguishing four key categories: management and coordination of the partners and the level of commitment expected from each of them; the involvement of the scientific communities; the interdependencies within the technical infrastructure of the platforms; and the sustainability of the project results. For each category, a detailed description and an appropriate risk mitigation methodology are provided.



Appendix A: Project Handbook

1. Working methods

With a high number of partners involved in the LUMEN project, working methods to facilitate communication and project documentation sharing are of central importance. The communication tools and working methods introduced in the following sections together will contribute to a working environment in which project members can collaborate and work in a most efficient way.

1.1 Document sharing, storage and retention

1.1.1 Shared drive

The PCO arranged for the project's own Google Shared Drive to be used. Documents can be stored, shared and collaboratively worked on in the Google Shared Drive.

Project members get access to the Google Shared Drive via Google-associated personal or institutional email addresses. Files in the Google Shared Drive are kept indefinitely so that files can be restored even if users delete messages and files, and then empty their trash.

It is possible to share individual files with people outside of the project, however edit permission is always granted to project members.

1.1.2 Presentations

Presentations prepared for and given at internal meetings, such as face-to-face meetings and side meetings at conferences, will be stored in the LUMEN Google Shared Drive. Specifics about the presentation and formal content of external presentations will be covered in D8.2 "Plan for communication and dissemination"⁴. WP8 will be in charge of tracking the external communication and dissemination activities of partners and ensure the respective KPIs are met.

1.1.3 Depositing data and outputs

The LUMEN project outputs will be deposited in the LUMEN Zenodo community⁵ during the active phase of the project.

WP8 is responsible for depositing the outputs in the Zenodo repository as they become available - this means creating and publishing a record in Zenodo. This includes deliverables (as a DRAFT before formal EC approval, to specify in the version property as detailed in 2.1) and underlying data, milestone documents when available

⁴ To be released in July 2025

⁵ LUMEN Zenodo community: <https://zenodo.org/communities/lumen-eu>

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as public reports, intermediary results and intermediary data, code (see 1.1.4), reports, and working documents, as well as event presentations and reports, and other public documentation produced by the project. Outputs must be deposited under a CC-BY licence and using recommended file formats (see DMP).

All public deliverables should be made available through Zenodo as soon as possible after their submission to the EC⁶. To facilitate this process, the WP8 lead is responsible to ensure that a DOI is reserved for their publication by pre-filling the metadata in Zenodo. The reserved DOI should be added to the 'DOI' metadata field in the deliverable template before the final submission to the PCO. This must be done via the common Zenodo upload account of the project. This is in order to facilitate stewardship of resources in the event of project team members leaving the team.

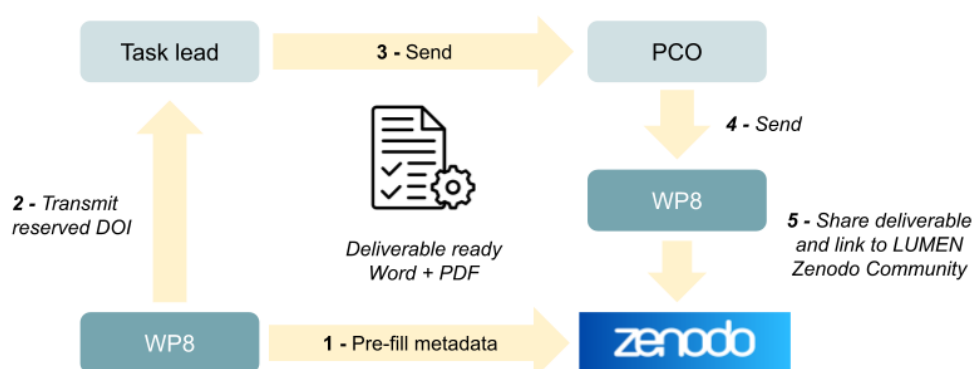


Figure #5: Deliverable DOI process

The DOI referenced within the metadata section of project outputs should be the 'Concept DOI'. This Concept DOI is used to refer to all versions of a record. For example, a project deliverable record may have several versions, one for each time a new and revised PDF-A has been uploaded. Each of these versions will have their own individual DOI number. The Concept DOI will always resolve to the latest version of a record, meaning that you do not have to update a DOI reference and URL each time a new version of that record is added.⁷

1.1.4 Code

Some tasks within the LUMEN project involve the development and management of source code. To ensure centralised, consistent, and aligned repository management,

⁶ In the period after submission to the EC but before EC approval, the deliverable should include information about the EC review; once approved, this information should be removed.

⁷ Turner, D., Kalaitzi, V., Grootveld, M., de Leeuw, L., Verburg, M., Priddy, M., Jonquet, C., & Davidson, J. *FAIR-IMPACT, Deliverable 1.1, Project Handbook*. (Not shared publicly).

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GitLab OPERAS has been designated as the single source of truth for hosting and collaborating on LUMEN-related code repositories.

GitLab OPERAS as the Primary Repository for LUMEN's Shared Data Platform

The source code related to the core components of the LUMEN Shared Data Platform, including the White Label Discovery Platform, the FAIR Semantic Management Space, and discovery tools like the LUMEN metasearch, will be hosted and managed within a dedicated group on GitLab OPERAS⁸. **Discussions are ongoing regarding the broader repository management strategy, including interoperability with GitHub, Zenodo, and Software Heritage.**

This strategy ensures:

- Clear organisation of development efforts by structuring repositories under a single LUMEN group, ensuring separation of concerns while fostering cross-team collaboration.
- Consistent access management, centralising all developments to streamline role assignments and permissions.
- Interoperability with EOSC and other Open Science initiatives, aligning with European standards for research data and software management.

Repository Structure

LUMEN follows a project and group-based structure to organise repositories. Each core component of the Shared Data Platform will have a dedicated repository, enabling modular development and collaboration. Additional repositories may be created for domain-specific tools and federated discovery services.

The following best practices apply:

- Public repositories are the default, ensuring openness and reusability. When necessary, GitHub repositories may be used as mirrors for external contributions, and Zenodo/Software Heritage will be considered for long-term archival and DOI assignment.
- Private repositories may be created only when necessary, subject to project team validation. Once the code is stabilised and reviewed, these repositories should be made public to comply with FAIR and Open Science principles.
- Standardised Git workflows, including continuous integration (CI/CD) and mandatory code reviews.

⁸ GitLab OPERAS: <https://gitlab.operas-eu.org/lumen>

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Access Management and Governance

Access to repositories and contribution rights are managed based on the following principles:

- Project members requiring access to a LUMEN repository must request it from the PCO.
- Repository creation requests must be formally submitted to the GitLab LUMEN Technical Coordinator.
- A dedicated governance model will ensure consistency in contributions and version management. **The repository management strategy is currently being refined to ensure alignment with partner needs, long-term sustainability, and integration with external open science infrastructures.**

More detailed information on repository management, workflows, and code openness policies will be provided in D1.4 DMP and Policies⁹. Additionally, as part of LUMEN's ongoing efforts to refine its repository strategy, a structured decision-making process is currently underway to evaluate the interoperability of GitLab OPERAS with GitHub for external contributions, and with Zenodo and Software Heritage for long-term archival and citation purposes.

1.2 Internal organisation

1.2.1 Rolling minutes

All WP and task meetings held within the context of the LUMEN project must be documented with an associated minutes document. WP8 has prepared a standardised template for this purpose. This template is accessible in the project's shared folder and must be used consistently by all consortium members.

1.2.2 Informed consent template

The coordinator provides an informed consent template to be used for interviews. This template is stored on the Google Shared Drive, in the T1.1 folder under "Informed consent template". The template can only be used in combination with an information sheet about the research project, which has to be set up individually by the partner responsible for conducting the interviews. Another template has been developed as part of WP3, with the possibility to re-use it as well, this one is in the T3.1 folder.

⁹ To be released in June 2025

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1.2.3 Mailing lists

The use of mailing lists is an effective way of addressing and informing a larger group of project members about project or WP issues. A generic list for the whole project, and specialised lists for project management and the WPs were created and are managed (see Appendix A). Members new to the project should contact the PCO for subscription to the PCO email address. In order to join WP mailing lists, project members are asked to contact the PCO. The project partner list is available on the Google Shared Drive, where any additions should be highlighted and the PCO notified via email.

1.2.4 Chat tool: Mattermost

The Mattermost¹⁰ platform (an open source and self hosted online service for chats and sharing of documents) facilitates daily communication, organised into public and private channels. It is hosted by the coordinator and access is provided via OPERAS. Partners are then invited to join up to channels based on their interests and project-related responsibilities. The platform has the advantage of supporting informal daily exchanges and the sharing of document links. The channels are organised by topic, allowing partners to quickly find the information they need and reducing the clutter in their email inboxes with messages unrelated to the LUMEN project. This system also ensures that information is only distributed to those directly involved. In addition, all conversations are archived and secured.

1.2.5 Online meetings

Zoom is used as conferencing software for online meetings. Other options for video conferencing (Google Meet, Teams, etc.) may be chosen if preferred. All project members are advised to familiarise themselves with the project DMP¹¹ to ensure that online webinars, workshops, training and other events comply with the data management and data protection guidelines set out by the project and EU regulations.

1.2.6 Face-to-face meetings

Plenary meetings of the whole project will take place three times throughout the project's lifetime: at the beginning (kick-off meeting), around the time mid-term is reached and at the end. WP1 will be in charge of organising them with the assistance of WP8 if needed.

Project meetings	Date	Place	Participants
Kick-off Meeting	20/01/2025	Hosted by OPERAS Brussels - Belgium	All consortium invited

¹⁰ <https://mattermost.com/>

¹¹ To be published in July 2025

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Virtual Consortium Gathering #1	Autumn 2025	Online	All consortium invited
Face-to-Face Consortium Meet #2	Spring 2026	Hosted by Net7 Pisa - Italy	All consortium invited
Virtual Consortium Gathering #2	Autumn 2026	Online	All consortium invited
Face-to-Face Consortium Meet Final event #3	September 2027	Hosted by University of Coimbra - Portugal	All consortium invited

1.2.7 LUMEN and third-party events

All participants are responsible for the content they present when representing LUMEN at third-party events or workshops organised for the project and should provide appropriate funding acknowledgement, use the project templates, inform their respective WP leader and WP8 for appropriate promotion and keep adequate records. WP8 - Dissemination and communication - will support this representation by providing LUMEN-branded templates as well as materials upon request by WP leaders. All contributions should comply with the relevant templates provided by WP8 within the Google Shared Drive.

2. Continuous reporting on Deliverables and Milestones

During the project, the consortium is expected to provide regular updates on the status of the project.

The continuous reporting includes:

- Progress in achieving milestones
- Deliverables
- Updates to the publishable summary
- Response to critical risks, publications, communications activities, IPRs
- Programme-specific monitoring information (if required).

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More information is available on the Online Manual/Deliverables & milestones¹².

All deliverables and official documents of LUMEN must include the acknowledgement of the project in the following manner: Project Acronym + "Funded by the European Union" + EU Flag.

2.1 LUMEN deliverables

The preparation of the deliverables is the responsibility of the partner assigned to the deliverable¹³, while the respective WP leader is responsible for managing that process, for initial quality control and for respecting the deadlines/reporting any delays or other issues on time.

The partner responsible for the deliverable provides it to the PCO, to **be sent for internal review one month before the formal due date**.

The PCO is responsible for submitting deliverables to the EC and assigning project members to review draft versions on a voluntary basis. Project members are encouraged to volunteer to review at least one of the 32 planned deliverables.

The **external reviewers have 10 working days to perform their review**. Where appropriate, the deliverables will be shared for public comments. Thereafter, the partner responsible for the deliverable carries out the revision.

The final version is submitted to the EC by the Project Coordinator and saved on the Google Shared Drive in .docx and .pdf. Figure 2 shows an overview of this process and the corresponding timeline. **The submitted version is uploaded on Zenodo, if the dissemination level is public.**

¹² EU Funding & Tenders Portal, <https://webgate.ec.europa.eu/funding-tenders-opportunities/pages/viewpage.action?pageId=1867968>

¹³ (see [Grant Agreement](#), Annex 1 - p.13-15: List of Deliverables)

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Responsibility	Partner responsible for the deliverable	Reviewers appointed	Partner responsible for the deliverable	PCO
Phases	Drafting / writing / completing	Internal review	Revision / Final Editing	Submit the document on the EC portal
	Create Word version and share through Google drive	Review the deliverable	Update the document according to review	
Timeline	Document to be submitted 4 weeks before the deadline	10 working days to review the deliverable	2 weeks to update it	DEADLINE

Figure#6: LUMEN deliverables process

In the event of a **potential delay in a deliverable**, the responsible WP Leader is required to notify the PCO by email and provide a detailed explanation of the delay at least three weeks before the deliverable deadline. This explanation will be used for communication with the Project Officer (PO). After consultation with the PO, the PCO will inform the relevant partners of the outcome of the consultation. Any delay and its explanation must also be documented in the next official periodic report.

Quality indicator	Reference
The deliverable is in accordance with the objectives and descriptions stated in the DoA	LUMEN GA Links with GoTriple if necessary Link with other EU projects if accurate
The deliverable is compliant with the templates and guidelines	LUMEN Deliverable template
The deliverable is legible and clear	Text structure Language and syntax errors Use of paragraphs and chapter Use of pictures, tables and diagrams Clear distinction between body and annexes
For deliverables that are not in written form, beneficiaries must provide a brief written description, including the means of verification and the location of the non-textual deliverable. This description must be submitted as a Word document using the provided deliverable template.	

Table #1: criteria for LUMEN deliverables

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2.2 LUMEN milestones

The project's milestones¹⁴ mark the completion of the significant activities of the project and are defined in the Grant Agreement. It is therefore important to report them in a timely fashion. Since each milestone is associated with one WP, **it is the responsibility of the respective WP leader to report to the PCO on the achievement of the milestone according to its due date.**

The PCO ensures timely achievement and reporting of milestones. The achievement of Milestones is also recorded in the EC Grant Management System.

Function of Milestones for the project:

- To act as a stepping stone towards a deliverable and make sure that teams are documenting their process and progress and getting something down on paper;
- To provide an update to internal (& where relevant external) stakeholders about the direction the team/task is going in – this is very relevant in LUMEN since it lets other tasks in the WP or other WPs have something they can refer to for understanding your work;
- Some milestones are considered as necessary steps which should be taken to ensure the quality of a deliverable or other project output (e.g. workshop).



Figure #7: Milestones development process

2.3 Formatting, referencing and writing style

Standard templates have been created for deliverables and the reporting of milestones. These templates are available on the Google Shared Drive.

It is mandatory that deliverables and milestone reports are prepared using the formatting as included in the template i.e. correct use of headings, font, font sizes etc. All Deliverables and Milestones should be stored in the Google Shared Drive both in .doc and .pdf formats.

For standardisation purposes, documents should follow British English for spelling. The European Commission has several resources which have been produced to help

¹⁴ (DoA - list of milestones page 25 - [Grant Agreement](#))

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its own employees when writing. This Style Guide¹⁵ document is particularly useful for more detailed writing concerns and also has useful advice on using inclusive language.

3. Periodic reporting

3.1 Internal reporting

Formal management and progress reporting, including financial reporting to the European Commission (EC) is due after the first and second year of the project, i.e. on M18 (June 2026) and M36 (December 2027).

The reporting is carried out using the EC Grant Management System that specifies the required contents: in essence, a periodic technical report and a periodic financial report. These reports are required by the European Commission within 60 days after the end of the period (respectively end of August 2026 and end of February 2027).

All participants are expected to contribute to the periodic report, but it is the project coordinator (CNRS) who submits it. The WP leaders are responsible for coordinating the contribution of their WPs as per the coordinators guidance.

All funded partners must provide an individual financial statement detailing their eligible costs for the period¹⁶. All participants must keep records and other supporting documentation in order to prove the proper implementation and the costs claimed¹⁷.

As already mentioned, all project participants must keep records and other supporting documentation in order to prove the proper implementation and the costs claimed. Participants need to be aware of their obligations. They need to provide adequate records and supporting documents, while usual accounting and internal control procedures must enable direct reconciliation between the amounts declared, the amounts recorded in their accounts and the amounts stated in the supporting documents. In the case of personnel costs, all participants need to keep timesheets. For more details, partners can consult the AGA-Annotated Grant Agreement Art 20¹⁸.

In addition to this reporting to the EC, reports for internal use will be required by the PCO from all partners every six month:

- iRP_1: M1-M6 (January - June 2025)
- iRP_2: M7-M12 (July- December 2025)

¹⁵ European Commission, https://commission.europa.eu/documents_en?prefLang=fr

¹⁶ More information on the formal reporting to the EC is available in the [Online Manual/Reports and Payment requests](#).

¹⁷ (see [AGA – Annotated Grant Agreement, art 20](#))

¹⁸ European Commission. (n.d.). *Annotated model grant agreement (AGA): Guidance*. Retrieved from https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/aga_en.pdf

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- iRP_3: M13-M18 (January - June 2026): sent to EC
- iRP_4: M19-M24 (July- December 2026)
- iRP_5: M25-M30 (January - June 2027)
- iRP_6: M31-M36 (July- December 2027): sent to EC

Including:

- Brief written reports of the activities of the partner per WP;
- Updates on work on deliverables, risks, problems, delays, and planned activities;
- A summary of meetings attended;
- Financial reporting per partner:
 - The staff effort (person-months) expended in the six month period per WP;
 - A summary of all personnel costs (amount) in the six month period per WP;
 - A breakdown and summary of non-staff costs such as travel, workshop costs, etc.

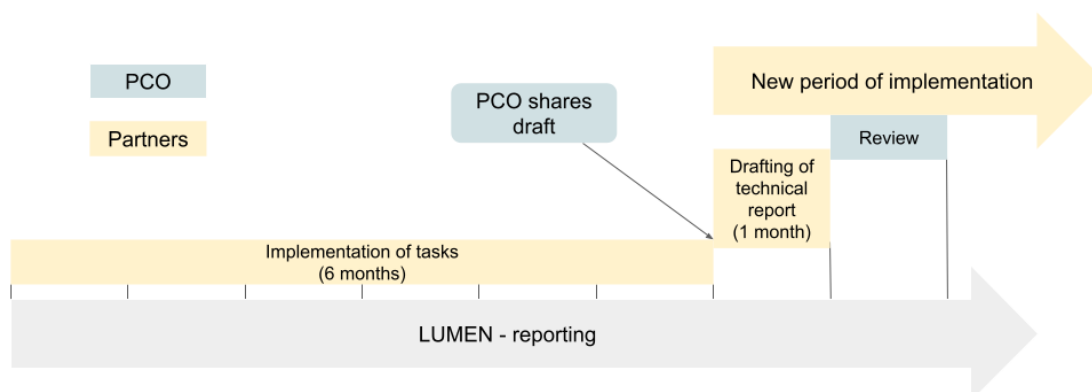


Figure #8: temporality of LUMEN technical and financial reporting

The key objective of this exercise is to allow effective monitoring of the project status and quality, provide structured information to make a detailed planning of the following activities, and allow eventual contingency plans to face critical issues and risks.

The PCO offers templates and guidance for every participant tailored to their involvement in the project. Templates include an internal reporting financial template per partner, an internal content reporting template per WP/task, content reporting for the periodic report per EC templates, and the dissemination tracker developed by WP8.

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3.2 Project reviews

In order to assess and evaluate the progress of the project in terms of the implementation of the activities, three official project reviews are planned. The Project Officer of the European Commission will invite the LUMEN coordination team and external evaluators. An indicative timetable, is set out in the Grant Agreement¹⁹.

The detailed agenda and logistics of the review meetings will be discussed and agreed in good time between the Project Coordinator and the Project Control Office (PCO). The project coordinator will keep the whole consortium informed of all decisions.

The internal organisation of the review meetings will follow this plan:

1. **The PCO is responsible** for the micro-planning of the review meetings, including the detailed agenda and logistics, in agreement with the EC PO.
2. **All consortium members will contribute to the preparation of materials** for the review according to the agreed format and in line with the detailed agenda. The PCO will collect the materials in a timely manner and submit them to the EC for formal review at least one week before the review meeting.
3. **A dry run of the meeting might be organised** by the project coordinator one or several days before the review, depending on the availability of the team members. During the dry run, the session will be rehearsed to ensure full agreement between team members on the content to be presented and their respective roles. The documentation will be fine-tuned during this process.
4. **The EC review takes place.**
5. After the review, the **Executive Board (EB) will meet** in a teleconference to discuss the feedback from the reviewers/EC and plan the next steps.
6. The plan will be finalised by the EB and approved by the General Assembly after receipt of the formal review letter, and the outcome will be communicated to the WP leaders.

¹⁹ Description of the action (DoA) - p.28

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Appendix B: mailing lists

As part of the LUMEN project, 15 mailing lists have been set up, each dedicated to a specific working group within the project. The members of these lists are self-selected and should follow the work plan outlined in the work agreement. The PCO is responsible for the management of these lists and may add or remove individuals according to the needs of the project.

List title	Description
Forum	<i>all project members</i>
WP1	<i>Self-declaration of the individuals belonging to the organisations that should participate in the WP according to the GA</i>
WP2	<i>Self-declaration of the individuals belonging to the organisations that should participate in the WP according to the GA</i>
WP3	<i>Self-declaration of the individuals belonging to the organisations that should participate in the WP according to the GA</i>
WP4	<i>Self-declaration of the individuals belonging to the organisations that should participate in the WP according to the GA</i>
WP5	<i>Self-declaration of the individuals belonging to the organisations that should participate in the WP according to the GA</i>
WP6	<i>Self-declaration of the individuals belonging to the organisations that should participate in the WP according to the GA</i>
WP7	<i>Self-declaration of the individuals belonging to the organisations that should participate in the WP according to the GA</i>
WP8	<i>Self-declaration of the individuals belonging to the organisations that should participate in the WP according to the GA</i>
General Assembly	<i>At least one participant per partner - self declared / designated by their organisation</i>
Executive board	<i>WP Leaders + Technical coordination + PCO</i>
Scientific Domain Committee	<i>Representatives from each scientific domain community addressed in the LUMEN project (SSH, Maths, Earth system and Molecular dynamics)</i>
PCO	<i>Scientific coordinator + Project manager (CNRS) + Project member from OPERAS + Administrative contact (CNRS)</i>
Administration LUMEN	<i>At least one representative per partner to follow administrative and financial topics in the LUMEN context.</i>
Technical Committee	<i>Representatives from WP2, WP3, WP4, WP5, WP6 + PCO (including Technical coordinator)</i>

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Appendix C: LUMEN SWOT

INTERNAL	Strengths	Weaknesses
	<p>Experienced team with continuity from GoTriple: <i>several project members were already involved in the implementation of GoTriple, which serves as a key inspiration for LUMEN.</i></p> <p>Positive and collaborative consortium atmosphere: <i>project benefits from a strong sense of cohesion and a constructive working environment within the consortium.</i></p> <p>Multidisciplinary and inclusive approach: <i>LUMEN brings together four diverse scientific communities, fostering interdisciplinary synergy and a rich exchange of perspectives.</i></p> <p>Integration of existing solutions with tailored development: <i>project builds on proven tools, such as the GoTriple platform, while developing equivalent solutions for other disciplines.</i></p> <p>Efficient governance and organisational structure: <i>clearly defined WPs with well-established responsibilities enable seamless coordination and effective project management.</i></p> <p>Focus on user experience and FAIR compliance: <i>two bodies, the WP3 and SDC are devoted to communities needs</i></p>	<p>Decentralised stakeholders: <i>involvement of multiple actors across different institutions and countries can make coordination more complex.</i></p> <p>Language barriers: <i>differences in language and terminology among partners may pose challenges for communication and knowledge exchange.</i></p> <p>Dependence on external contributions: <i>project' success relies on the engagement of scientific community representatives (via WP3 and SDC) and public-private partnerships. This dependence introduces risks if misalignment occurs or if there are delays in gathering community needs.</i></p> <p>Ambitious scope and technological challenges: <i>the simultaneous development of multiple innovative tools and their integration within a European framework presents significant technical challenges, particularly regarding interoperability and compliance with EOSC standards.</i></p> <p>Resistance to change and varied adoption rates: <i>some communities or users may be reluctant to adopt new practices and tools, particularly if these require significant shifts from traditional working methods.</i></p>

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EXTERNAL	Opportunities	Threats
	<p>Alignment with the EOSC initiative: <i>by adhering to EOSC standards and integrating with core European services (AAI, PIDs, monitoring, and support systems), LUMEN benefits from a recognised and robust reference framework.</i></p> <p>Advancing open science and FAIR data: <i>LUMEN aligns with the global movement towards transparency, accessibility, and collaboration in research, positioning itself as a catalyst for open scientific practices.</i></p> <p>Potential for standardisation and innovation: <i>project offers an opportunity to define new standards and best practices for data management and interoperability, potentially serving as a model for other international initiatives.</i></p> <p>Fostering synergies and collaboration networks: <i>by engaging stakeholders from both the public and private sectors, as well as diverse scientific communities, LUMEN facilitates the emergence of strategic partnerships and the expansion of research networks.</i></p> <p>Developing sustainable business models: <i>establishing viable exploitation models beyond the funding period could enable the commercial or institutional adoption of the developed tools, ensuring their long-term sustainability.</i></p>	<p>Required innovations with emerging technologies: <i>need to innovate using nascent technologies introduces uncertainties and potential challenges in terms of reliability and scalability.</i></p> <p>Rapid technological evolution: <i>fast-paced advancements in information and research technologies risk rendering some solutions obsolete if the project does not continuously adapt to market developments.</i></p> <p>Uncertainties post-European funding: <i>the 2027 funding horizon represents a critical juncture for the project. A lack of continued financial or institutional support beyond this point could jeopardise the sustainability of the developments achieved.</i></p> <p>Competition and parallel initiatives: <i>emerging projects or similar solutions, both within Europe and internationally, could compete with the LUMEN initiative, potentially affecting its long-term visibility and impact.</i></p>

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Appendix D: LUMEN - list of risks

#Risk	Categorisation	Risks identified	Mitigation measures	In charge
4	Global management	<i>Strong deviations from schedule and budget and tasks</i>	<ul style="list-style-type: none"> - internal reporting every 6 months - possibility for amendment and budget transfer - implementation of corrective action according to the issues faced - Regular communication with WP Leaders 	Project Manager / WP1 Lead
3	Global management	<i>Inappropriate management</i>	<ul style="list-style-type: none"> - Participation of PCO in WP meetings and committees to understand how the consortium is going - Possibility to easily chat with PCO - Regular reporting periods to check the overall project 	Project Manager / WP1 Lead
8	Global management	<i>Misunderstanding of responsibilities</i>	<ul style="list-style-type: none"> - organisation of bilateral meetings to clarify everyone's role - management sheet for each WP 	Project Manager / WP1 Lead
2	Global management	<i>Non alignment with data privacy rules and procedures</i>	<ul style="list-style-type: none"> - Review of the DMP by all WP Leaders - circulation of the DMP among the Consortium - clarification of the procedures in D1.1 - Open access to the procedures in Google Drive - regular communication with PCO 	Project Manager / WP1 Lead
5	Global management	<i>Defaulting partner</i>	<ul style="list-style-type: none"> - internal reporting every 6 months - possibility for amendment and budget transfer - implementation of corrective action according to the issues faced 	Project Manager / WP1 Lead

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#Risk	Categorisation	Risks identified	Mitigation measures	In charge
			- Regular communication with WP Leaders	
17	Scientific communities	<i>Misalignment between the use cases identified in WP3 and the strategic needs and expectations expressed by the representatives of the four scientific communities, potentially leading to low adoption and relevance issues.</i>	<ul style="list-style-type: none"> - Ensure that the lens matrix already formalized for LUMEN serves as a guiding reference throughout WP3. - Establish regular validation checkpoints with community representatives to ensure alignment between identified use cases and strategic needs. - Implement an iterative feedback loop where community representatives actively review and refine use case definitions before finalization. - regular meetings with technical coordinator 	Scientific Communities Coordinator
1	Scientific communities	<i>Building solutions too far from communities' needs</i>	<ul style="list-style-type: none"> -monthly meetings with scientific communities - participation of the technical coordinator in the SDC - regular participation of WP3 in the TC 	Scientific Communities Coordinator
13	Scientific communities	<i>Users and scientific domains involvement</i>	<ul style="list-style-type: none"> - The scientific domains committee secures the users engagement. LUMEN consortium can also strengthen the links with other projects to enhance the involvement of users/ -Workshops in which each scientific community will be organised. 	Scientific Communities Coordinator
6	Global management	<i>Incorrect synchronisation of technical WPs</i>	<ul style="list-style-type: none"> - Monthly technical meeting - identification of dependencies through a GANT Chart - 6-months planning for technical committee to examine 	Technical coordinator

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#Risk	Categorisation	Risks identified	Mitigation measures	In charge
			<i>interdependencies</i>	
25	Scientific communities	<i>Some communities may struggle to structure their data as Data Products and implement Data Contracts, potentially slowing down their integration into the Data Mesh architecture and compromising interoperability across platforms.</i>	<ul style="list-style-type: none"> - Provide early guidance and support to each community in structuring their Data Products. - Define a minimum viable Data Contract model to prevent bottlenecks for less mature communities. - Set up a regular monitoring process to track community progress in integrating into the Data Mesh. -Scientific coordinator will liaise and encourage mutual learning between communities, notably those who are very advanced in terms of data management and the ones less advanced. 	Technical coordinator
7	Sustainability	<i>Development apart from EOSC ecosystem</i>	<ul style="list-style-type: none"> - EOSC Board of Directors member leads the LUMEN consortium - WP5 is dedicated to EOSC liaison - Good knowledge of EOSC in the Consortium 	Technical coordinator
24	Technical infrastructure	<i>Premature adoption of the White Label Platform by the MD community without an intermediary API, potentially locking the architecture and limiting the scalability of data and services.</i>	<ul style="list-style-type: none"> - Address this point in the architecture document developed in Task 4.1, in collaboration with the involved partners. - Plan a refactoring mechanism in case future adjustments are needed. 	Technical coordinator
20	Technical infrastructure	<i>Gaps in FAIR data elements from the use case providers</i>	<i>Regular communication with use case providers, compliance with design specifications and requirements developed by WP1, WP2</i>	Technical coordinator

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#Risk	Categorisation	Risks identified	Mitigation measures	In charge
			<i>and WP3 will be employed for mitigation</i>	
27	Technical infrastructure	<i>Possible troubles with continuous FAIR data quality</i>	<ul style="list-style-type: none"> - good understanding of the delivered features from WP4 in order to expose the reusable services - well prepared/tested/verified REST APIs 	Technical coordinator
9	Scientific communities	<i>Lack of semantic interoperability between communities could lead to fragmented and incompatible artefacts, limiting their reuse and impact within LUMEN.</i>	<ul style="list-style-type: none"> - Define common interoperability guidelines early in WP2. - Establish cross-community validation checkpoints to ensure alignment of ontologies and taxonomies. - Leverage existing best practices from projects like FAIRsFAIR, OntoCommons, and FAIR-Impact. 	WP2 Lead
10	Scientific communities	<i>Limited adoption of the FAIR Semantic Management Space by communities could reduce its effectiveness and impact.</i>	<ul style="list-style-type: none"> - Provide hands-on training and clear documentation to facilitate adoption. - Develop user-friendly workflows that match community needs. - Engage early adopters to showcase successful use cases and encourage wider adoption. 	WP2 Lead
11	Technical infrastructure	<i>AI-based automation of the FAIR Semantic Management Space may be ineffective due to lack of annotated data or poor alignment of models with community needs.</i>	<ul style="list-style-type: none"> - Ensure sufficient annotated datasets are available for training AI models. - Continuously evaluate and refine the performance of AI-based automation with community feedback. - Maintain a manual fallback mechanism to correct errors and refine AI outputs. 	WP2 Lead

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#Risk	Categorisation	Risks identified	Mitigation measures	In charge
12	Technical infrastructure	<i>Difficulties to collaborate with tool developers to integrate them together</i>	<i>- Fork existing tools and further develop the integration layer.</i>	WP2 Lead
15	Global management	<i>Difficulties in planning the Use Cases execution</i>	<i>The task leader will work actively with the domains and the technical partners. Ad hoc meetings will be organised, and monitoring will be put in place</i>	WP3 Lead
18	Scientific communities	<i>Some scientific communities may engage with LUMEN but not fully adopt or integrate it into their workflows, reducing its real impact and interdisciplinary collaboration.</i>	<i>- Develop concrete and demonstrative use cases early in the project to showcase impact.</i> <i>- Engage key early adopters from each community to drive active usage.</i> <i>- Maintain a continuous feedback loop to align LUMEN's features with real user needs.</i>	WP3 Lead
16	Technical infrastructure	<i>Excessive complexity in user needs from codesign</i>	<i>Constant dialogues between user research/codesign work and partners producing graphical user interface will mitigate this risk</i>	WP3 Lead
19	Technical infrastructure	<i>Technologies too far apart to build proper interoperability</i>	<i>Already good knowledge of the existing partners, especially because all of them are involved in complementary initiatives (RDA WGs, EOSC-A TFs, European RIs, funded projects, (etc.)).</i>	WP4 Lead
21	Technical infrastructure	<i>Metamodel not effectively designed to allow data interoperability amongst the datamesh</i>	<i>Partners have extensive experience in data modeling and in the application of the FAIR principles. The team that designs the model will also be involved in the implementation tasks of the Data Mesh architecture, limiting the possible issues of missed communication and goals mismatch.</i>	WP4 Lead

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#Risk	Categorisation	Risks identified	Mitigation measures	In charge
23	Technical infrastructure	<i>Data Mesh architecture not effective in allowing data interoperability amongst the different Discovery Platforms</i>	<i>Three of the four Discovery Platforms of the project will share the same technology, implemented inside the White Label platform. Specific attention will be devoted to involve the team responsible for the integration of the Maths' Discovery Platform in all design phases of the Data Mesh architecture.</i>	WP4 Lead
22	Technical infrastructure	<i>Difficulties in generalising and abstracting the GoTriple software component to effectively implement the White Label Platform</i>	<i>GoTriple software components are already highly configurable. Moreover, the LUMEN consortium includes the main partners responsible for the original implementation of these components, reducing the start-up time needed for all the technical refactoring that will be identified in the course of the project.</i>	WP4 Lead
26	Sustainability	<i>EOSC integration issues</i>	<ul style="list-style-type: none"> - careful monitoring (of effort and achievements, but also developments of EOSC EU Node) - well prepared analysis and issues to investigate (our requirements / vision) - insights from other partners could be helpful (especially those involved in other EOSC activities) 	WP5 Lead
29	Sustainability	<i>The cloud infrastructure may face scalability or deployment challenges, affecting the reliability and long-term viability of LUMEN services.</i>	<ul style="list-style-type: none"> - Define clear scalability requirements and conduct stress tests before deployment. - Ensure flexible cloud orchestration, leveraging containerization and automation best practices. - Avoid lock-in by prioritizing open-source and cloud-agnostic solutions. 	WP5 Lead

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#Risk	Categorisation	Risks identified	Mitigation measures	In charge
28	Technical infrastructure	<i>The complexity of integrating LUMEN services with EOSC Core could lead to delays and technical challenges, limiting access to key infrastructure.</i>	<ul style="list-style-type: none"> - Engage early in discussions with EOSC Core teams to anticipate integration requirements. - Conduct technical feasibility assessments before onboarding to EOSC services. 	WP5 Lead
32	Technical infrastructure	<i>Incomplete or inconsistent metadata from discovery platforms could reduce the efficiency and relevance of the interdisciplinary meta-search system.</i>	<ul style="list-style-type: none"> - Establish clear metadata and API requirements aligned with WP4 and WP2. - Ensure continuous validation of data integration in coordination with the Federated Shared Data Governance (WP7.5). - Implement fallback mechanisms to handle missing metadata and ensure robust query performance. 	WP6 Lead
31	Technical infrastructure	<i>Gaps in FAIR data elements from the use case providers</i>	<i>Regular communication with use case providers, compliance with design specifications and requirements developed by WP1, WP2 and WP3 will be employed for mitigation</i>	WP6 Lead
35	Technical infrastructure	<i>Visualization tools can have high computational requirements for large data sets, which will affect the responsiveness of the system.</i>	<ul style="list-style-type: none"> - Simulation of heavy system load to find bottlenecks. - Indexing, result caching mechanisms, real-time query reduction. 	WP6 Lead
36	Technical infrastructure	<i>Software catalogue - Risk of errors when automatically extracting data from different repositories. Possible duplicates, errors and problems with updating information and maintaining catalog consistency.</i>	<i>Regular validation of metadata quality, automatic testing of metadata correctness and completeness.</i>	WP6 Lead

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#Risk	Categorisation	Risks identified	Mitigation measures	In charge
33	Technical infrastructure	<i>Chatbots using LLMs may produce biased or inaccurate responses, reducing trust and usability for researchers.</i>	<ul style="list-style-type: none"> - Implement domain-specific fine-tuning and continuous validation of chatbot responses. - Provide explainability mechanisms to clarify how responses are generated. - Ensure human oversight and allow users to report inaccuracies for improvement 	WP6 Lead
34	Technical infrastructure	<i>Advanced visualisation tools may not align with researchers' workflows, leading to low adoption.</i>	<ul style="list-style-type: none"> - Advanced visualisation tools may not align with researchers' workflows - Conduct early usability testing with researchers to refine design and interaction. - Provide clear documentation and training for end users. - Ensure seamless integration with existing discovery platforms and research tools. leading to low adoption. 	WP6 Lead
30	Technical infrastructure	<i>Technologies too far apart to build proper interoperability</i>	<i>Already good knowledge of the existing partners, especially because all of them are involved in complementary initiatives (RDA WGs, EOSC-A TFs, European RIs, funded projects, (etc.)).</i>	WP6 Lead
37	Global management	<i>Insufficient stakeholder engagement and feedback affecting exploitation planning and sustainability</i>	<i>Leverage partners' networks and EOSC/ESFRI communities; Develop clear value propositions for LUMEN assets; Proactive communication strategy; Regular stakeholder consultation events; Mobilization of multiplier networks</i>	WP7 Lead
38	Sustainability	<i>Unsustainable business models for LUMEN services and failure to secure long-term financial viability</i>	<i>Regular assessment and adjustment of exploitation strategies through continuous dialogue with communities; Development of multiple exploitation scenarios; Validation through IPL/EOSC</i>	WP7 Lead

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#Risk	Categorisation	Risks identified	Mitigation measures	In charge
			<i>Innovation Centre activities and stakeholder workshops; Early identification of institutional champions within scientific communities</i>	
40	Sustainability	<i>Market evolution and technology changes affecting exploitation potential</i>	<i>Regular monitoring of EOSC and research infrastructure landscape; Agile approach to exploitation planning; Flexible business model development; Close alignment with emerging community needs and technological trends</i>	WP7 Lead
41	Sustainability	<i>IPR conflicts between multiple partners affecting exploitation paths</i>	<i>Clear IPR agreements early in project; Detailed documentation of background IP; Regular IPR reviews during exploitation planning; Established procedures for handling IP disputes</i>	WP7 Lead
39	Sustainability	<i>Complex governance model integration challenges due to multiple existing stakeholder structures and EOSC alignment requirements</i>	<i>Early engagement with key stakeholders; Clear documentation of existing governance structures; Regular stakeholder workshops; Iterative development with feedback cycles; Close coordination with EOSC governance bodies</i>	WP7 Lead
42	Scientific communities	<i>Scientific communities stay "severed" from one another</i>	<i>Through dedicated communication campaigns and through T8.5 being dedicated to consolidate a well-connected, interdisciplinary community the risk of a lacking connection and, thereby, efficiency among the scientific disciplines will be mitigated.</i>	WP8 Lead
43	Scientific communities	<i>Difficulties coordinating communication efforts targeting 4 scientific communities</i>	<i>Through T8.5 & T8.4, WP8 will initiate and monitor activities targeting individual disciplines as well as initiate and monitor discipline-transversal activities as well as their impact.</i>	WP8 Lead

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#Risk	Categorisation	Risks identified	Mitigation measures	In charge
14	Scientific communities	<i>Lack of engagement/feedback from the various stakeholder groups</i>	<i>Through partners' networks and coordinated action towards the large set of EOSC and ESFRI and Use Case Communities, the risk of lack of engagement will be mitigated. We will work on "buy-in" arguments and messages to clarify the value proposition for the various LUMEN assets and we will further mobilise the multiplier networks. Lastly, more proactive use of communication tools exploiting social media networks and other multipliers.</i>	WP8 Lead
44	Sustainability	<i>Social Media Migration</i>	<i>With a large amount of the scientific community leaving X and changing social media platforms, WP8 will closely follow the development. Two social media channels (LinkedIn & Bluesky) will be created and used for communication activities to mitigate the risk.</i>	WP8 Lead