EIC ELMs Portfolio

Deliverable 9.10

ELSA Activities in RP2

Project Number: 101071145

Project Acronym: FUNGATERIA

Project title: Enlisting synthetic fungal-bacteria consortia to produce multi-cellular mycelium-based ELMs with computational capability.

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DELIVERABLE FACTSHEET

Project Acronym | Number		FUNGATERIA | 101071145	
Deliverable Title:	ELSA activities in RP2		
Deliverable Description:	Report on the activities, outcomes and planned follow up to address ethical, legal and social aspects (ELSA). These activities include engagement with strategic partners (including the public), and dissemination of best practices and guidelines when applicable with the ELMs field. Any confidential information related to these activities will be included in the technical report.		
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TABLE OF CONTENTS

Deliverable factsheet 2
Project Consortium 2
1 Contribution from the WG ELSA 4
1.1 Meetings 4
1.2 Merging WG ELSA with WG Regulation 4
1.3 Booster grant application for autumn school 6
2 Specific contribution from the members of the project 7
2.1 Contribution to the ethics discussion 7
3 Conclusions 8

1 Contribution from the WG ELSA

1.1 Meetings

WG ELSA met regularly during the period from 1 November 2023 to 1 January 2025, holding discussions on 14 March, 16 May, 6 June, 4 December, and 18 December, while addressing any other pending matters via email. These meetings served as key moments for the group to exchange insights, share updates on ongoing initiatives, and align activities across the ELM platform. Despite variations in attendance, the meetings provided a valuable platform for constructive dialogue on the ethical, legal, and societal aspects relevant to Engineering Living Materials (ELMs).

While participation in these meetings was occasionally on the narrow side, those who attended contributed with a high level of expertise and engagement. The quality of input received significantly enriched the discussions, particularly in terms of identifying emerging issues, refining the scope of planned activities, and ensuring that ELSA remained an integrated framework for addressing the complexities of ELMs. The diverse disciplinary backgrounds of participants further enhanced the discussions, offering multi-faceted perspectives on the challenges and opportunities within ELSA.

The outcomes of the meetings have laid a solid foundation for future initiatives, including the plans for a 2025 autumn School and the broader integration of regulatory issues within ELSA activities. To build on this momentum, we will organise regular meetings moving forward. We also aim to fine-tune the merger of WG ELSA with WG Regulation, ensuring a more cohesive and collaborative approach. Additionally, we are hopeful about reapplying for a booster grant, which would enable the organisation of our autumn school and related activities. Another key initiative on the horizon is the initiation of a co-authored white paper, which will further consolidate our efforts and share insights from the working group. These ongoing engagements will continue to emphasise the importance of sustained dialogue and collaborative expertise across the platform, ensuring that the ethical, legal, and societal dimensions of ELMs remain at the forefront of our work.

1.2 Merging WG ELSA with WG Regulation

In December 2023 a decision was made to merge WG ELSA with WG Regulation. The decision stemmed from the evident overlap between the legal component of ELSA and regulatory concerns in the context of Engineering Living Materials (ELMs). Recognising the need to integrate ELSA considerations with regulatory frameworks, the consortium merged the ELSA and Regulation working groups to address issues of safety, societal impact, and responsible innovation comprehensively This merger seeks to address fragmentation and enhance collaboration within the ELM platform by combining efforts that are inherently

interconnected. By unifying these working groups, the aim is to streamline activities, strengthen the focus on regulatory matters, and foster a comprehensive dialogue across ELM projects. Such integration also facilitates a more cohesive approach to addressing ethical, legal, and societal aspects alongside regulatory challenges. Progress has been made in defining roles and responsibilities, and the strategic plan is currently being revised to reflect this new structure.

The rationale for the merger lies in the historical and conceptual underpinnings of ELSA, which encompasses ethics, legal, and societal aspects. Since its inception during the Human Genome Project, ELSA has evolved to address the broader implications of emerging technologies, including nanotechnology and now ELMs. The decision to revive the ELSA framework, rather than solely relying on more recent frameworks like Responsible Research and Innovation (RRI) or Open Science, reflects its ability to provide a dynamic and integrated approach. RRI and Open Science, while valuable, have faced criticism for neglecting regulatory considerations and failing to integrate ethical, legal, and societal dimensions effectively. To ensure the success of the merger, it is critical to have active participation from members of both working groups. This includes identifying two WG members to follow up on any initiatives related to regulation to provide continuity and insight. These are: Silvia Holler and Jose Maria Perez Pomares.

To support ongoing dialogue and maintain momentum, the merged working group plans to host quarterly online meetings. These meetings will focus on recurring ethical, legal, and societal issues, regulatory knowledge gaps, and social perceptions of ELM innovations. By involving coordinators from various ELM projects early in the process, the group aims to ensure alignment, enhance collaboration, and generate actionable insights.

In the broader context, the decision to merge these working groups underscores the value of the ELSA framework in addressing the complex interplay between innovation, governance, and societal needs. By combining ethical, legal, and societal considerations with regulatory insights, the merged working group seeks to establish a more integrated and impactful approach to fostering responsible and sustainable ELM development. Regular updates and communication between the merged working group and other ELM working groups are essential, especially since the current chair and co-chair is not part of the ELM steering committee. Establishing a robust framework for interaction will ensure cross-pollination of ideas and knowledge sharing across projects.

Already in 2022, WG ELSA had identified the idea of an autumn School as a flagship initiative. It will now integrate legal and regulatory issues such as safety by design, dual-use concerns, and intellectual property rights. The Autumn School will serve as a platform to engage researchers, stakeholders, and external experts, fostering a deeper understanding of these themes. Apart from the school, a deeper analysis will be made to identify the informational needs of ELM projects regarding regulation. The school on ELSA and ELMs aims to cover topics such as health and safety, social perceptions of technology, global justice

in intellectual property, and the transition from constraint-based ethics to constructive ELSA approaches.

1.3 Booster grant application for autumn school

WG ELSA-Regulation was advised to pursue a pending call for a booster grant to find funding for the organization of the Autumn School mentioned in the previous section. The booster grant aimed to fund not merely the Autumn School but also a dedicated ELSA program during SynSci2026 in Glasgow, ensuring impactful engagement and collaboration. These efforts were designed to support the creation of a white paper capturing key recommendations for responsible ELM innovation.

A key motivation behind the Booster Grant application was to advance the Engineering Living Materials (ELMs) portfolio by addressing the Ethical, Legal, and Social Aspects (ELSA) and Regulatory Considerations tied to these innovations. The application aimed to secure funding to support pivotal activities that would ensure the responsible development of ELMs. Unfortunately, the booster grant call was not posted, and WG ELSA-Regulation is now awaiting confirmation on whether a new call will be announced in the future.
The Booster Grant application itself focused on three main activities: organising an in-person Autumn School in 2025, hosting a symposium at a European conference, and producing a co-authored peer-reviewed white paper on ELSA and regulatory considerations of ELMs. These activities were designed to be led by the PRISM-LT project, with input from other ELM portfolio projects, to strengthen the responsible development of ELMs. The projects collectively sought to ensure ELM innovations aligned with societal needs and values, fostered public trust, and facilitated market uptake.

The initiative addressed ELMs as transformative materials combining living cells to enhance functionality and sustainability, with applications in healthcare, infrastructure, and beyond. The proposed activities aimed to build a robust research community, anticipate and address ELSA concerns, and contribute to regulatory debates surrounding ELMs. The Autumn School focused on engaging researchers, innovators, and stakeholders in understanding ELSA dimensions, with emphasis on transparency, public engagement, and alignment with regulatory standards. The consortium planned to organise the symposium and develop the white paper to disseminate insights broadly.

The planned activities were broken into key tasks. For the Autumn School, Laurens Landeweerd outlined objectives such as developing a comprehensive programme covering ELSA and regulatory themes, engaging expert speakers, designing interactive sessions, and ensuring inclusive participation. For the SynSci2026 event, the consortium intended to focus on advanced ELSA topics, coordinate with conference organisers, and facilitate discussions among diverse stakeholders. Intended deliverables include a detailed report summarising the Autumn School and SynSci2026 programme, along with a manuscript outlining key findings and insights for dissemination.

Through these efforts, the consortium seeks to foster synergies among ELM portfolio projects, build strategic partnerships, and raise the visibility of ELM research within Europe. By embedding ELSA considerations into training and innovation, the ELSA activities aim to support the responsible development and societal integration of ELMs. The white paper and associated outputs are intended to serve as valuable resources for ongoing and future ELM initiatives.

2 Specific contribution from the members of the project

2.1 Contribution to the ethics discussion

In November 2024, the FUNGATERIA held an internal workshop together with the project's Independent External Ethics Board (IEEB), to expand the project's ethical engagement beyond the concerns of biosafety in the lab. Three focus areas were identified for the discussion, developed together with the IEEB:

1. **Material Technologies**

2. **Definitions and their Implications**

3. **Design, Participation and Interspecies Co-working**

The workshop sessions confirmed that ELMs challenge conventional boundaries between organism and material, living and inert and distinctions between the natural and artificial. This necessitates a fundamental shift in ethical, regulatory and design paradigms. Through the discussions, it became clear that traditional frameworks fall short in addressing the dynamic, relational and novel nature of ELMs. Overall, the session underscored the need for a paradigm shift in how we think about materials, ethics and collaboration. It also highlighted that the frameworks we look towards developing must evolve alongside the materials themselves, with a move toward models that are biocentric, open-ended and deeply relational.

This prompts a call for adaptive, value-sensitive and participatory approaches. Ethical stewardship must evolve toward shared responsibility, emphasising transparency, precaution and ongoing care across the entire lifecycle of these materials. Public engagement should be reimagined as a generative and co-creative process, while design practices must move beyond anthropocentric models to embrace interspecies collaboration and respect.

The workshop has identified a rich and complex arena of positions and perspectives that point to the need for further enquiry and development of the ethical landscape in relation to ELM development and use in general. Key focus areas to address include: refining definitions, building flexible governance structures, institutionalising inclusive participation to challenge and enrich design approaches and fostering cross-disciplinary literacy to responsibly shape the futures these living technologies enable.

The findings of the workshop have been reported in the FUNGATRIA Deliverable - D10-3_OEI-Requirement-No-3. It is felt amongst the project consortium that these findings can contribute to the ELSA discussion within the ELM Portfolio. As a first step towards sharing, we propose that a summary of the findings can be presented at the ELM Portfolio PhD and Post-doc Monthly seminar.

3 Conclusions

Although the project level activities reported here have occurred at the individual project level, it is felt that the outcomes hold relevance for the ELM Portfolio in general and should be shared.

An immediate pathway for sharing is throught he Monthly PhD and Post-doc series. This could be used as a springboard for identifying how the findings can link to, or spur additional, activities within the ELSA workgroup.