EIC ELMs Portfolio

Deliverable 9.5
ELSA Activities in RP1

Project Number: 101071145

Project Acronym: FUNGATERIA

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

Project start: 01 November 2022

Project duration: 48 months

European Innovation Council

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DELIVERABLE FACTSHEET

Project Acronym | Number		FUNGATERIA | 101071145	
Deliverable Title:	ELSA Activities in RP1		
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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EXECUTIVE SUMMARY

The overall goal of the activities within the ELM portfolio related to ELSA is to achieve a reconnaissance for normative analysis of moral principles, societal values, and user experience aspects in the development of ELMs to ensure societal uptake, long-term applications and scaling-up possibilities.

Since the research involved in most projects has not achieved a sufficiently mature stage to inform extensive ELSA activities, most work for this year involved strategising, discussing potentially useful plans for the future and articulating these through project internal discussions and the joint ELM portfolio meetings.

FUNGATERIA is actively engaging with the ELSA working group. This is both in terms of portfolio activities proposed by the ELSA working group and project internal activities. While common activities focus on education, project internal activities will focus on upstream public engagement. EMLs are still at an emerging stage, this opens the opportunity for citizens to inform technological trajectories with societal values before the technology stabilizes and gets to a moment of technical closure.

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1 Contribution from the WG ELSA

1.1 Overall goal and delimitation:

The overall goal of the activities within the ELM portfolio related to ELSA is to achieve a reconnaissance for normative analysis of moral principles, societal values, and user experience aspects in the development of ELMs to ensure societal uptake, long-term applications and scaling-up possibilities.

Since ELSA stands for 'ethical, legal and social aspects' it is important to delimit the activities of WG ELSA from WG Regulation on the one hand (avoiding overlaps in terms of 'legal') and WG Path-to-Market on the other (avoiding overlaps where 'social aspects' meet 'socio-economic' aspects). To this aim, we have determined that only the ethical aspects of regulation and economy will be taken into account for WG ELSA's currently planned activities.

1.2 Actions for this year

Since the research involved in most projects has not achieved a sufficiently mature stage to inform extensive ELSA activities, most work for this year involved strategising, discussing potentially useful plans for the future and articulating these through project internal discussions and the joint ELM portfolio meetings. To this aim a number of exchanges took place between the chair and cochair of WG ELSA (Laurens Landeweerd (Radboud University) & Elvin Karana (TUDelft)). Their preliminary plans were presented during the January 17th meeting of the working groups of the portfolio activities, and adjusted after feedback. Below you can find an overview of the achievements up to this point of WG ELSA.

Meetings:

Date	Purpose	Participants
12-1-2023	EIC Pathfinder ELMs Portfolio: Kick-off meeting	WG SC
1-2-2023	co-chairs discuss potential plans	Elvin Karana, Laurens Landeweerd
9-2-2023	ELMs: SC meeting for Strategic Plan	WG SC
21-2-2023	ELMs Strategic Plan discussion with Danos	all WG representatives
26-9-2023	feedback discussion workplan WG ELSA	all WG ELSA representatives

We propose a combination of sub-activities, framing ELSA-related topics as cumulative rather than individual efforts. The combined approach to ethical and social aspects serves to assess and explore the basic technological vocabularies of the ELMs, their impact on values and attitudes of all relevant stakeholders, including relevant public perceptions, and aid in steering the innovation. This will facilitate the adoption, application and embedding of the technologies under development.

As the work in the Regulation WG progresses, common legal issues might be identified. In that event, this WG will create a proposal to address these.

1.3 OBJECTIVE:

For WG ELSA we identified the following objectives:

- to equip the next generation of ELM designers with a more in-depth knowledge, tools, and methods from the social and legal sciences and philosophy/ethics
- to familiarize ELM designers with social and ethical aspects of ELMs and enable them to take them into account in the material development as an ex-ante design feature

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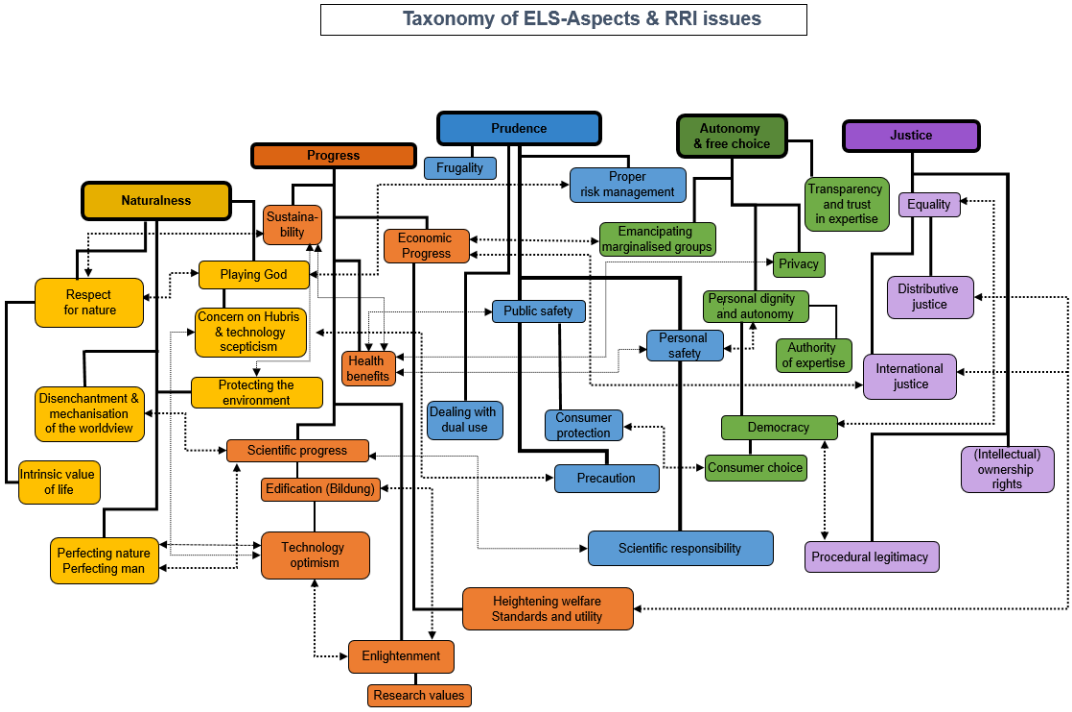
1.4 ACTIVITY:

In order to achieve our objectives, we drafted a plan to organize a Summer School on "Biodesign and Ethics for Society". We propose to organize this summer school for all PhD and Post Doc researchers of the portfolio ELM projects including lectures, panel discussion, workshops, and brainstorming sessions, during which they can be immersed into the world of living materials societal aspects and ethics. *The summer school will preferably take place on location, but seen the lack of budget, we may choose to elaborate an online format*. The summer school will predominantly aim for mutual learning between projects, and knowledge sharing. We will therefore invite **all members of WG ELSA** as speaker and/or panel member. We will also invite external expertise:

- The **Bioethics** panel, led by Laurens Landeweerd may include external experts in Ethics of Biotechnology (e.g., Lotte Asveld (TUDelft, involved in NextSkins), Patricia Osseweijer (TUDelft, chair of Biotechnology and Society), Zoey Robaey (Wageningen University), Vitor dos Santos (Wageningen University).
- The **Biodesign** panel and workshops, led by Elvin Karana, may include external experts such as Carole Collet (CSM), and biodesigners, such as Maurizio Montalti, Emma van der Leest, Teresa van Dongen.

1.4.1 Framework:



The above framework, developed over the past 15 years in a number of Dutch national and European projects[1], serves to identify different relevant ELSA and RRI issues. Seen its relatively generic nature and broad applicability, we propose it as a backdrop for the ELSA activities planned for the upcoming periods.

[1] Developed and tested out in: Dutch Research Council (NWO) projects: User-producer interactions for functional genomics innovations; KINESIS; TBBF and further elaborated in; FP7-SIS: Value Isobars; ENHANCE; SynthEthics; Synenergene.

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1.4.2 Topics to be covered in Ethical Aspects:

Ethical analysis and integration of stakeholder values, perceptions and expectations, including impact for governance; to create a network for the ELM's societal embedding and impact; to develop and deploy an ethical approach to ELM development and the portfolio project communication.

1.4.3 Topics to be covered in Legal Aspects:

Most topics related to legal aspects will be covered by WG Regulation. In some cases, relevant ethical and social dimensions of law and regulation might emerge. Complementarity with WG Regulation will be ensured.

1.4.4 Topics to be covered in Social Aspects:

Understanding end user experience with living materials and integrate this understanding in the design of ELMs to inspire new approaches to co-creation and inclusive material development, and to take into account ethically relevant effects of an embedding of ELMs in society Complementarity with WG Path-to-Market will be ensured.

1.5 NEED/CHALLENGE/OPPORTUNITY:

To establish a shared understanding of what social and ethical aspects of ELMs entail and how we can align these qualities with social values, needs, preferences and desires.

1.6 TIMING and LINKS to other WG's:

We plan to organise the summer school during the 3rd year (in the summer) since by that time, the projects already have some initial results. If not online, a location will need to be decided upon, but a location close to an international airport would be advisable. v. All PhDs and Post Docs of the portfolio ELM projects will be invited to this summer school. The activities proposed by WG ELSA are to be linked to and leveraged by the Communication WG and the Path to Market WG.

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2 Specific contribution from the members of the project

The ELSA activities carried out by the FUNGATERIA consortium are in line with aims at promoting public engagement with technical development of ELMs, and at facilitating training and education in ethical, legal and social aspects related to ELMs for coming generations of researchers. This includes both participation in the meetings of the portfolio working group, participation in the "Biodesign and Ethics for Society" summer school, and consortium driven initiatives. These activities are summarized in what follows.

2.1 Completed activities

In the period from March to October 2023, we collaborated with the **UiO: Life Science training** initiative by supervising an educational project. A student designed and carried out a summer project that concluded with a report and poster presentation. The student was trained in qualitative methods approaches often used in ELSA research. The objective of the project was to contribute to a mapping of public issues and concerns regarding EMLs.

FUNGATERIA has taken part in strategic discussions of the ELSA portfolio working group, including design decisions, and has expressed commitment to participate in the "Biodesign and Ethics for Society" summer school.

2.2 Activities ahead

The FUNGATERIA working plan includes several consortium activities to engage with publics and that seek to produce knowledge on European citizens' views and values regarding ELMs. A number of these activities are informed by social sciences approaches, as well as by design and art perspectives. In the coming period, the main activity is public engagement event (workshop) with the title "Co-Living with Engineered Living Materials". This event will take place at the Natural History Museum-Botanical Gardens in Oslo (25 November). The aim of this workshop is to explore European citizens' sense and sensing of EMLs using participatory and speculative methods, and focusing on materials and sensing. Fifteen participants have registered to this event. The workshop's methodology is designed to establish upstream dialogue with both general and interested publics, in line with previous ELSA research.

Partners in FUNGATERIA will actively take part in the summer school on "Biodesign and Ethics for Society". PIs in the consortium will encourage PhD students and post-docs to take part in it. Several PIs in the FUNGATERIA consortium have offered to participate in teaching activities if needed. A more concrete plan on how FUNGATERIA will participate in this school will follow as the activities, schedule and venue for this summer school is defined. FUNGATERIA partners are willing to participate actively in the design of the summer school.

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3 Conclusions

FUNGATERIA is actively engaging with ELSA activities. This is both portfolio activities proposed by the ELSA working group and project internal activities. While common activities focus on education, project internal activities will focus on upstream public engagement. EMLs are still at an emerging stage, this opens the opportunity for citizens to inform technological trajectories with societal values before the technology stabilizes and gets to a moment of technical closure. Upstream engagement will lead to socially robust development of EMLs.