

Preparing a proposal MSE 493

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2025

What is a proposal?

- Your best bet at solving a **problem**
- Your best bet at solving a **knowledge gap** (especially if it unlocks some useful knowledge)
- You're not clairvoyant – you apply your **research** and **expertise** to try and anticipate what you need to do to solve the problem
- Even if you are wrong in the end, it's OK. A well-designed and grounded proposal will certainly lead to new and useful knowledge.
- Since following up on a proposal usually involves resources (\$\$\$), it helps if it solves something meaningful to the funder



RachelAnitra

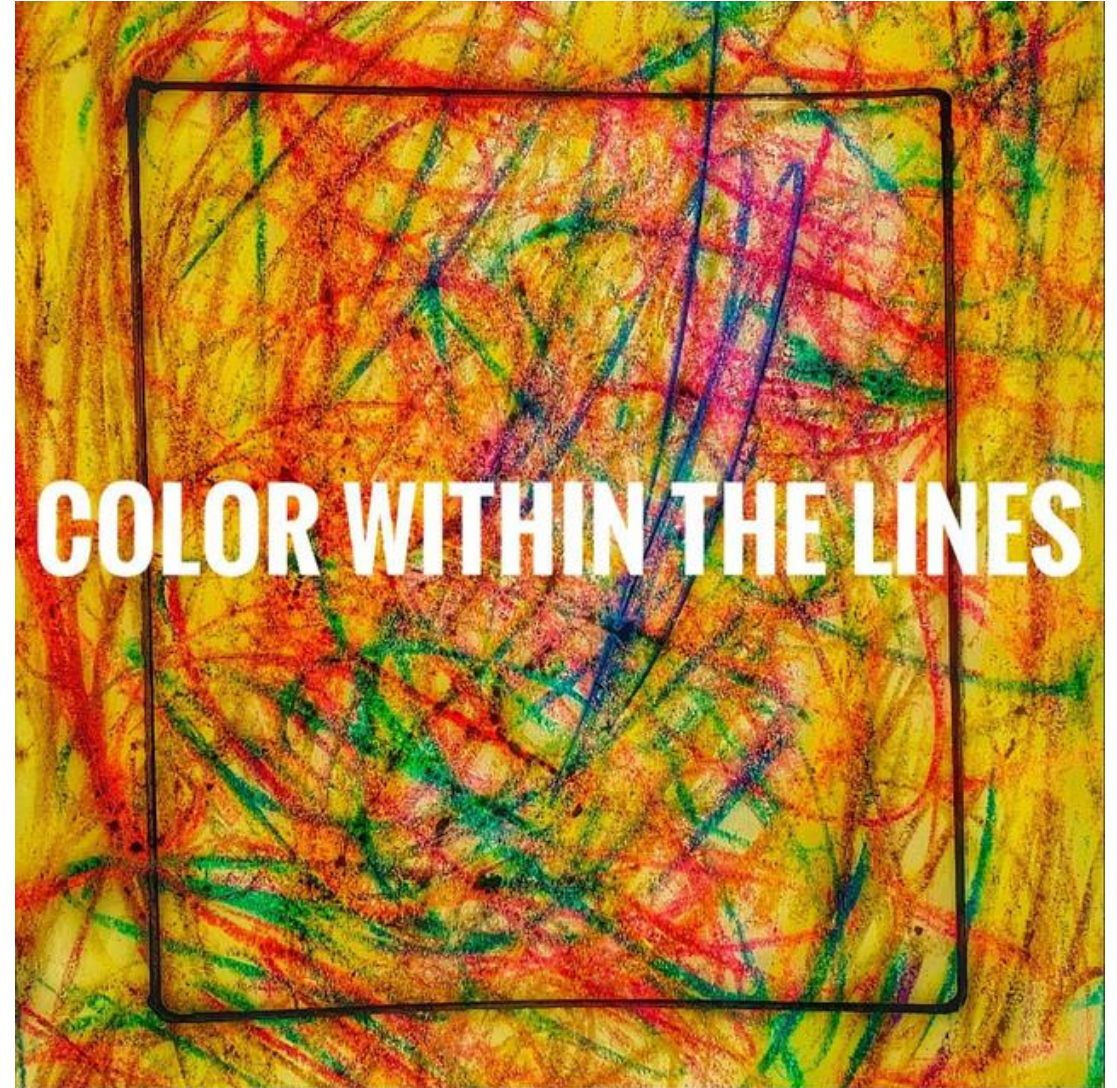
Realistic proposal scenarios

- In life
- Start-up/ entrepreneurial
- In industry/ job
- In academia/ research
- At its heart: *What are you trying to solve/get, for who (who pays?), what are the resources available (framework), what do you realistically hope to achieve? After all is said and done, how is success achieved?*



Resources create the border of your proposal

- Setting realistic goals for the proposal (!!! Less is more...)
- Identifying what resources will be needed to achieve the objectives of the proposal
- These resources include things like key **equipment** (maybe you already have the equipment, maybe not), key **personnel** (salary), **time**, miscellaneous items like consumables and travel
- Maybe you have been given a budget or time target
- You may have to tailor your proposal to work within the bounds of your available resources...such is life



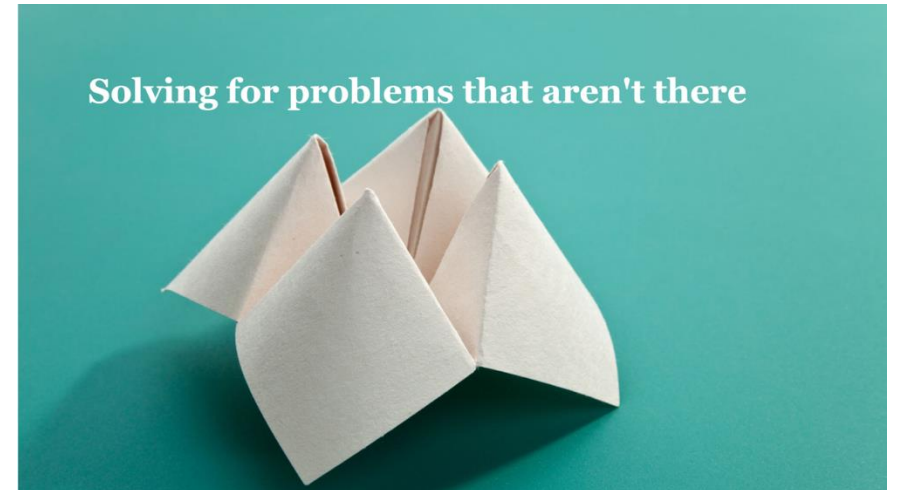
For this assignment: IDEA is the first step

- Hardest part
- Choose a topic that you are interested
- Should somehow be within the scope of this class: **biology + material**
- This is super hard – when industry or your professor gives you the problem, half the work is done... but how do you come up with the problem?
- This is where you can shine! Think and be creative!



What's your proposal idea?

- Make sure you are solving a problem that someone cares about and is willing to pay for. (Just because you think you have a solution for industry XYZ doesn't mean they will see it your way – be humble and speak to the stakeholders to understand ***their actual problems***)
- Sometimes we work on “solutions” that no one wants (you might get in trouble when you start to sell your idea, and you find no one wants to buy it...)
- Avoid this waste of time and resources.
- How? Do your homework – research, surveys, talk to people... look at some of the funding call websites I have shared



You can role play your proposal scenario...Imagine:

- You work for company XYZ that want to develop a new, specific product – there is an internal competition for budget allocation for this new product (*you are told what the goal is, but not how to get there*)
- You work for company XYZ and they have XYZ\$ to spend on research this year. There is an internal competition for this research budget (the idea is yours!)
- You have an idea for a start up and you are now competing to get to the next level to fund your idea (start ups compete for resources all along the journey)



Your proposal will be a bit different depending on the audience and funding vehicle! **Be specific about the funding vehicle in your poster proposal!**

You can role play your proposal scenario...Imagine:

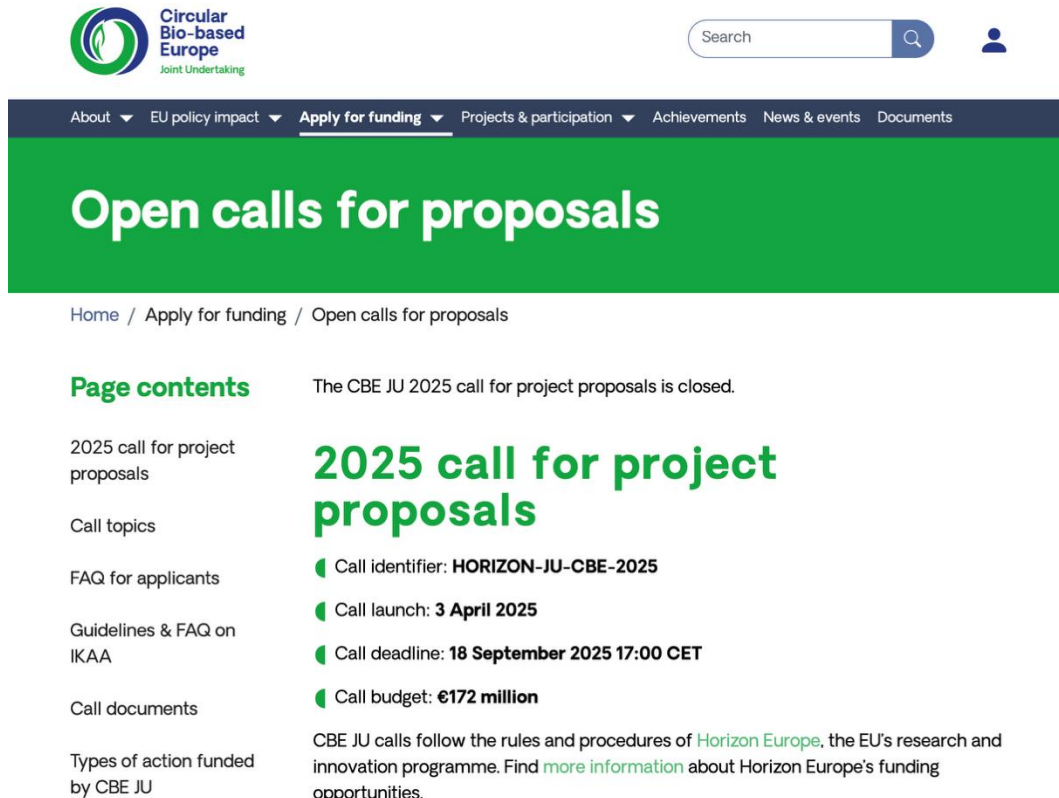
- Your region has designated topics of interest that you can submit proposals for (“calls” on strategic topics are at the heart of many EU project)
- You apply for funding to a private fellowships also have funding for research on specific topics of interest; e.g., [Gates Foundation](#)
- You are an academic researcher, and you have your own idea that you want to pursue, here the idea is yours and you will compete with other researchers



Your proposal will be a bit different depending on the audience and funding vehicle! **Be specific about the funding vehicle in your poster proposal!**

Circular Bio-Based Europe

- <https://www.cbe.europa.eu/open-calls-proposals>
- You can suggest solutions for identified topics!



The screenshot shows the website header with the logo 'Circular Bio-based Europe Joint Undertaking', a search bar, and a navigation menu. The main content area features a green banner with the text 'Open calls for proposals'. Below this, there is a breadcrumb trail: 'Home / Apply for funding / Open calls for proposals'. A 'Page contents' sidebar lists various links. The main text area contains a notice that the 2025 call for project proposals is closed, followed by a large green heading '2025 call for project proposals' and several key details: call identifier (HORIZON-JU-CBE-2025), launch date (3 April 2025), deadline (18 September 2025 17:00 CET), and budget (€172 million). A final paragraph explains that CBE JU calls follow the rules of Horizon Europe.

Page contents

- 2025 call for project proposals
- Call topics
- FAQ for applicants
- Guidelines & FAQ on IKA
- Call documents
- Types of action funded by CBE JU

The CBE JU 2025 call for project proposals is closed.

2025 call for project proposals

- Call identifier: **HORIZON-JU-CBE-2025**
- Call launch: **3 April 2025**
- Call deadline: **18 September 2025 17:00 CET**
- Call budget: **€172 million**

CBE JU calls follow the rules and procedures of [Horizon Europe](#), the EU's research and innovation programme. Find [more information](#) about Horizon Europe's funding opportunities.

Some topics:

[Urban-industrial symbiosis for bio-waste valorisation](#)

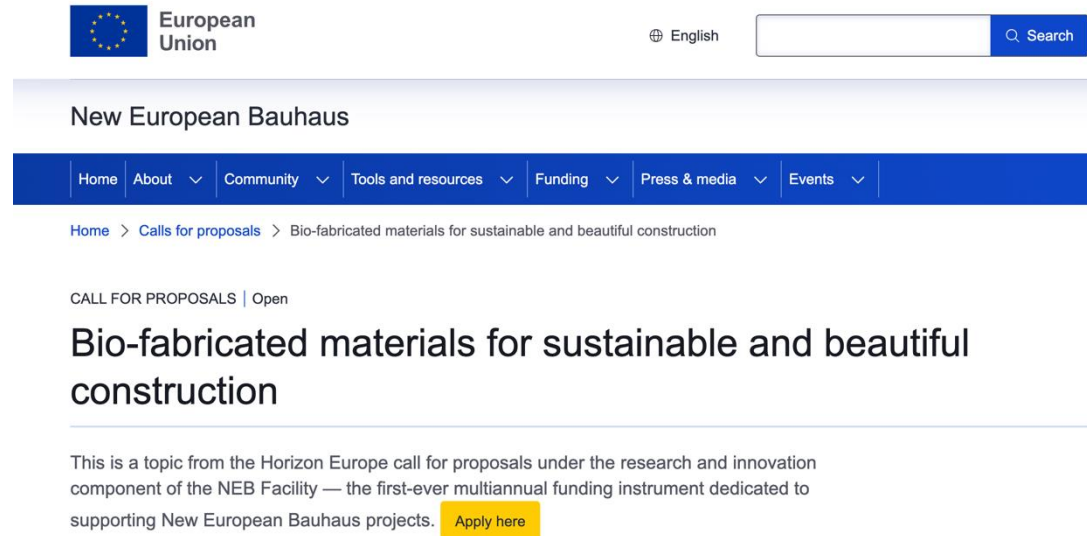
[Bio-based drop-ins/smart drop-in platform chemicals, via cost-effective, sustainable and resource-efficient conversion of biomass](#)

[Circular-by-design fibre-based packaging with improved properties](#)

[Sustainable macroalgae systems for innovative, added-value applications: cultivation and optimised production systems](#)

[Scaling-up nutritional proteins from alternative sources](#)

[Bio-based and biodegradable delivery systems for fertilising products to reduce microplastics pollution & promote soil health](#)



The screenshot shows the top navigation bar of the New European Bauhaus website. It includes the European Union logo, the text 'European Union', a language selector set to 'English', and a search bar. Below the navigation bar is a blue header with the text 'New European Bauhaus'. A secondary navigation bar contains links for 'Home', 'About', 'Community', 'Tools and resources', 'Funding', 'Press & media', and 'Events'. A breadcrumb trail reads 'Home > Calls for proposals > Bio-fabricated materials for sustainable and beautiful construction'. The main content area features the text 'CALL FOR PROPOSALS | Open' followed by the title 'Bio-fabricated materials for sustainable and beautiful construction'. A paragraph below explains that this is a topic from the Horizon Europe call for proposals under the research and innovation component of the NEB Facility. A yellow button labeled 'Apply here' is positioned at the end of the paragraph.

https://new-european-bauhaus.europa.eu/calls-proposals/bio-fabricated-materials-sustainable-and-beautiful-construction_en

Description

Project results are expected to contribute to all of the following expected outcomes:

- **Bio-fabricated construction materials** and their beneficial properties are better known and accepted by construction ecosystem professionals.
- Innovative, sustainably sourced, beautiful bio-fabricated construction materials can be produced at mass-scale at competitive costs.

For this assignment: IDEA is the first step



- You have an idea!
- You could spend a year or more studying a field and then locating knowledge gaps that you think are important
- You can ask someone that is knowledgeable
- You can take inspiration from academic groups or industry – what problems are they trying to solve? Could you take a different approach to the same problem?
- Look at governmental or other calls...
- Ask ChatGPT for help?
- Many options

Key elements of a scientific research proposal

1. A title, sometimes something catchy helps
2. Executive summary (a little like an abstract)
3. Background/problem statement
4. Objectives or goals
5. Proposed solution/methodology
6. Timeline/Workplan
7. Budget/Resources
8. Expected outcomes/Impact
9. Contingency plans
10. Conclusion (remind me why this is important)

Let's have all these elements in your poster proposal + tell me who the targeted funder is (can be a logo to indicate this) + TRL

Normally, this might be a 15-page document. Your goal is also to condense this into a poster pitch! Visuals! Imagine you are competing with your classmates and 1 of your ideas will be funded!

If we break it all down:

- **Proposal idea/statement of problem** (can come from you, from industry, government, etc.) – ask yourself what is the purpose of this research? What will it add to the state-of-the art? (Think big!)
- **Background** - this is where you convince your evaluator that you know the field. Describe the state of the art and in the context of this, describe why your research is **needed**. (**This is like a literature summary and should include key citations in your field**).
- **How will you do this research** – describe key experiments and explain how they will be performed. (You should also cite key literature that shows these methods are do-able). What is the key equipment you will need?

If we break it all down:

- **Timeline** How long should this work take? Be ambitious but not extreme... Industry-funded projects might be shorter (0-12 month), academia can be longer (2-5 y) but there are no fixed rules... let's say you should target a project that might be accomplished in < 5 years.
- Depending on how long the project is you might break it down into different objectives or work packages, all with an associated timeline, we use a Gantt Chart to show how the project is envisioned in time
- **Resources** This includes people and the money you might need to pay for external services, travel, etc. For the purpose, of this exercise, let us only consider the number of people that you need to do the work (more people, more \$\$\$).
- If you have 1 full time person/year over a 5-year project, this is 60 PM (person months) – this is a handy metric for the size/cost of a project
- We can also rank the personnel: A: Expert; B: Experienced; C: Newbie (I made this up); maybe for a 2-year project you need: 48 PM for C; 6 PM for B; 2 PM for A

If we break it all down:



- **Contingency:** Identify some key risks in your research and describe how you will mitigate these risks; this shows that you have thought through all possible scenarios and have developed back-up plans
- This can be done in a Table

Technology Readiness Level

Technology Readiness Levels (TRLs) provide a guide to the stage of development. TRLs are used in the Work Programme for guidance, but do not preclude support for non-technological innovations. A strong degree of importance will also be given to market readiness and business readiness, as described in the award criteria of the call texts. The following definitions of TRLs apply, recognising that there are important differences between technological fields.

TRL Level	Description
TRL 1	Basic principles observed
TRL 2	Technology concept formulated
TRL 3	Experimental proof of concept
TRL 4	Technology validated in lab
TRL 5	Technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)
TRL 6	Technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)
TRL 7	System prototype demonstration in operational environment
TRL 8	System complete and qualified
TRL 9	Actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies, or in space)

Specify TRL:

At the start & what you think it will be after your project

If you are conducting fundamental research, ending at TRL 3-4 is pretty good

Source: EIC Work Programme 2025, p20ff [\[link\]](#)

Chat GPT (my attempt)

- **Prompt:** European Funding call: https://new-european-bauhaus.europa.eu/calls-proposals/bio-fabricated-materials-sustainable-and-beautiful-construction_en

I am in a course called Engineered Living Materials. I think that self-repairing concrete can fit the call - can you give me 3 concise ideas that are novel and of interest to the call and involve self-repairing concrete?

It gave me 3 ideas; I asked it to follow up on idea #2 (randomly)

It's OK to use Chat GPT to start (acknowledge the brainstorming help but be careful to overuse)

Project Title

ALGAEcrete — Living Self-Repairing Façade Panels for Carbon-Positive Architecture

1. Overview (Summary)

ALGAEcrete aims to develop and demonstrate prefabricated façade panels that integrate **self-healing concrete** with **photosynthetic algae and mineral-precipitating bacteria**.

These panels will **self-repair micro-cracks, capture atmospheric CO₂**, and provide a **living, dynamic aesthetic** responsive to light and humidity.

The result: a **bio-fabricated, low-maintenance, and visually engaging construction material** that extends building lifespan while contributing to carbon neutrality.

2. Objectives

1. **Develop** a dual-layer living concrete panel combining:
 - an **inner self-healing concrete core** (bacterial calcium carbonate precipitation), and
 - an **outer bio-active layer** containing algae in a porous, light-permeable biocement matrix.
2. **Demonstrate** carbon capture (≥ 5 kg CO₂/m² year) and autonomous crack repair within 28 days of damage.
3. **Assess** aesthetic adaptability (colour, texture evolution), durability, and structural performance.
4. **Evaluate** environmental impact (LCA, SLCA) and prepare a **scaling roadmap** for architectural adoption.

Hmmm it
promises a
lot...

I like the
title...



3. Methodology & Work Packages

WP	Title	Duration	Key Activities
WP1	<i>Design & Bio-Integration</i>	M1–M6	Select algal and bacterial strains; formulate compatible matrices; design layered panel prototypes.
WP2	<i>Material Fabrication & Testing</i>	M6–M14	Produce small-scale panels; test self-healing (mechanical & micro-CT), CO ₂ uptake, light exposure durability.
WP3	<i>Prototype Development & Aesthetic Evaluation</i>	M12–M20	Build 1 m ² façade demonstrator panels; monitor biological activity and visual evolution under real outdoor conditions.
WP4	<i>Sustainability, Safety & Life-Cycle Analysis</i>	M16–M22	LCA, SLCA, circularity metrics, biosafety evaluation, waste management plan.
WP5	<i>Dissemination & Exploitation</i>	M1–M24	Communication via NEB networks, architecture exhibitions, IP strategy, commercialization pathways.

Very ambitious, how will you do WP1? What if you don't succeed!



4. Consortium (example structure)

- **University Department of Engineered Living Materials (Coordinator)** — microbial integration & materials testing.
 - **Architectural Design Institute / NEB Lab** — design and aesthetic validation.
 - **Prefab Concrete Manufacturer (SME)** — industrial upscaling & production.
 - **Sustainability Consultancy** — LCA, SLCA, dissemination.
-

5. Expected Outcomes

- TRL 4→6 bio-fabricated concrete panels ready for pilot demonstration.
- Verified **self-healing efficiency > 80%** for microcracks ≤ 0.5 mm.
- Demonstrated **carbon uptake** and **aesthetic adaptability** (biocolour modulation).
- **LCA results** showing $\geq 30\%$ reduction in embodied CO₂ vs standard façades.
- Public showcase aligning with **New European Bauhaus principles** — *sustainability, inclusion, beauty*.



6. Timeline (24 months)

Phase	Months	Milestone
Concept & Strain Selection	0–6	Lab prototypes ready
Material Fabrication & Testing	6–14	Proof-of-concept validation
Pilot Panels & Demonstration	12–20	Outdoor test completed
Evaluation & Dissemination	20–24	Final results + exhibition

7. Indicative Budget

Approx. **€1.2 million total** (EU contribution \approx €1 million):

- 35% R&D personnel
- 25% material testing & equipment
- 15% pilot prototyping
- 10% dissemination & design exhibitions
- 15% overheads

I could of course ask more:

Contingency, literature survey, to adapt to the elements I asked you to provide on slide 12, etc.,

do you think 2 years is too ambitious

Excellent and very realistic question — and the short answer is:

👉 **Two years is feasible only if the project scope is tightly managed and prototyping scale is modest (TRL \approx 4 \rightarrow 6).**

But if you imagine *full façade demonstrators, outdoor testing, and aesthetic validation*, it becomes **quite ambitious** for a 24-month window.

Here's a breakdown so you can judge where to trim or extend:

Chat GPT was like cool 2 years, it agreed with me, did what was asked, but didn't question whether my timeline was realistic?

An unrealistic timeline will cost your credibility!



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Experimental plan, contingency, literature survey, that it adapt to the elements I asked for on slide 12, etc.,

This wouldn't give you a good grade btw...

On LLM use

- If an LLM can do all this for you... what's the point of doing the assignment? (You are the boss, it's the tool)
- Use the LLM (**optionally** – please do disclose if you did, you will not be penalized, I am just curious)
- Use in conjunction with your research/reading/own ideas. **Remember: It's tool only.**
- But sure, why not explore how it might help you?
- What to avoid: LLM oversimplifications, overstatements, over-positive language, em dashes, generalizations, hallucinations, fake sources, agreeableness (you can often get an LLM to agree with you, even if you are wrong!), relying on the LMM to set the logic and flow.

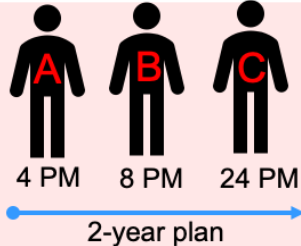
Graphical elements

- A poster is a visual tool, you are encouraged to use visual elements where they make sense, such as:
 - To describe a workflow
 - To schematically illustrate a concept
 - Your timeline (a Gantt chart)

Grading scheme - poster

Element	Description	Grade
Title	Catchy and informative	1
Group # and names	-	-2 if missing
Abstract	High level summary of the proposal – why the research is needed and what it's societal impact might be	2
Background/problem statement	Tell us what you are trying to address and the current state of the art; key references in the field (not reviews) are required	5
Objective(s)	What are the scientific challenges you will attempt to answer?	2
Proposed solution/methodology	How will you achieve your goals	10

Grading scheme - poster

Element	Description	Grade
Timeline/Workplan*	Divide the project into a workplan/tasks and estimate how long each task will take? What is the total length of the project? Be realistic!	3 (Gantt chart)
Budget/resources*	Assume you have all the equipment you need, but estimate how many people you will need in person months (PMs and according to skill level) Be realistic!	3 
Contingency plans	Identify key challenges you might face in your research and explain how you will mitigate these risks	4
References	Make sure to have a complete ref section.	-5 if missing refs

Grading scheme - poster

Element	Description	Grade
AI statement	Short statement describing how you used AI, if you used AI	Honor system
Graphical elements and design	Appropriate use and clarity of graphical elements and text	10
Overall logical flow of presentation	Were you able to guide us through your pitch and poster presentation in a straightforward and logical way?	10

Grade increments: 1 point

Total points: 50

Remember that you need to hand in your poster ahead of Dec 9, since we will print!

Gantt chart/resources

Define the total project length – 2 year

Make a task list – 3 tasks that should be defined

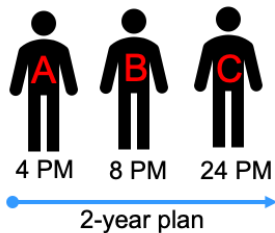
Decide how long each task should take

Tasks can overlap in time

Define the relevant time interval – 2 month

Make sure you define/reference your tasks in the section on the proposed solution

	M2	M4	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24
Task 1												
Task 2												
Task 3												



Objective: Conductive hydrogel for environmental sensing of organic pollutants

Task 1: Grow living mycelium hydrogel with CNT (3 species)

Task 2: Process and characterize material (conductivity, rheology)

Task 3: 3D print conductive living hydrogel and establish sensing behavior

What if you are really struggling to find an idea???

- No worries, we have a plan B (always)
- Use a paper from the recent ELM literature, you can even use a paper related to the literature we covered in class (you must include the citation!)
- Use this paper as inspiration for your proposal – e.g., your proposal can cover the next development in this work, or can be a way to address shortcomings that we found in class or that the authors themselves mentioned in their article...

Takeaways

- Idea generation is the 1st and most important step; less is more perhaps – thinly small project, ideally with a big impact! If in doubt, start from a paper you know and like.
- The proposed research should make sense and serve a purpose
- Fill in the items in grading scheme; they should be realistic
- We didn't discuss a lot on poster design: but this is important - you want to design a poster that is logical and easy to follow and SUPPORTs you in your pitch, not the other way around
- Questions?