

# How to Plan a Successful Experiment

## **Purpose/Description**

This guide is a roadmap for scientists and principal investigators (PIs) who wish to plan and execute experiments at a LaserNetUS facility. It offers insights and best practices to streamline the process, from the initial idea stage to conducting the experiment, ensuring that you stay on track toward a successful outcome.

### **Table of Contents**

Purpose/Description	1
Table of Contents	1
1. Introduction	2
2. Idea stage (~ 3 months)	2
Find a Research Topic	2
Develop the Idea for Your Experiment	3
Write and Submit the Proposal	3
3. Experiment stage (~ 6–9 months)	3
Once You Receive the Results of Your Proposal Submission	4
Review Feedback	4
Next Steps	4
Prepare for the Experiment	4
Conclusion	5

# **1. Introduction**

Designing and planning an experiment can be an exciting yet complex process. Establishing a solid framework and scheduling regular check-ins can keep you and your team organized and focused. This guide outlines a recommended approach; however, please customize it according to your own experiences and preferred work styles.

The experiment-planning process can be divided into two main stages: the **idea stage**, where you formulate your experimental concept, and the **experiment stage**, where the idea is fully realized and executed. Figure 1 provides a high-level overview of the possible timelines and activities involved in planning for, implementing, and following up on an experiment.



**Fig. 1:** Example timeline for planning an experiment. The research topic and experimental idea are formed during the idea stage. During the experiment stage, the details of the experiment are worked out, and the experiment is conducted.

# 2. Idea stage (~ 3 months)

This stage consists of three primary tasks:

- 1. Find a Research Topic
- 2. Develop the Idea for an Experiment
- 3. Write and Submit the Proposal

### Find a Research Topic

Generating a compelling experiment focus can be challenging. If you have a unique approach to address an existing question, that's fantastic! If not, don't worry—there's no need to start from scratch. Your first step should be thorough research:

- Read recently published papers to identify remaining questions.
- Attend conferences, such as the LaserNetUS User Meeting, to learn about current trends.
- Review funding and research needs reports from your institution.
- Discuss ongoing research with colleagues.

### **Develop the Idea for Your Experiment**

In addition to research, engaging with fellow scientists can refine your concept. Reach out to the following parties:

- Colleagues and friends in relevant fields
- Laser facility staff for insights
- Other researchers within or outside the LaserNetUS community

Maintain a notebook to track your evolving ideas—it may help later as you refine your proposal.

With your idea solidified, begin drafting your proposal. Use your notes and insights as your foundation. Follow the LaserNetUS proposal template and guidelines. Ensure that you circulate the draft among co-proposers at least a week before the deadline for feedback.

### Write and Submit the Proposal

With your idea solidified, begin drafting your proposal. Use your notes and insights as your foundation.. Please circulate the draft among co-proposers at least a week before the deadline for feedback. Follow the <u>LaserNetUS proposal template and guidelines</u>. It's best practice to send the proposal to all co-proposers at least a week before the submission deadline to get input on the draft and allow time for final edits. Ensure that you obtain consent from all co-proposers before listing them on your proposal.

# 3. Experiment stage (~ 6-9 months)

After you submit the proposal, it will take a few months for the Proposal Review Panel (PRP) to review it and consult with the facilities on the feasibility of the proposed experiment. You will receive an email from the PRP once they decide which experiments will be accepted for experimental time at a given facility for the upcoming cycle.

### **Once You Receive the Results of Your Proposal Submission**

Typically, you can expect to receive feedback regarding your proposal submission within **3–4 months after submission**. The review process involves multiple phases to ensure a thorough evaluation and informed decisions.

#### **Review Feedback**

Upon receiving news about the status of your proposal, take the time to thoroughly review the feedback from the Proposal Review Panel (PRP). If your proposal is accepted, congratulations! If it isn't, view this as a valuable opportunity for growth. Constructive critique can be instrumental to your success; we highly encourage you to revise and resubmit your proposal during the next proposal cycle. Many successful experiments have evolved positively from prior feedback.

#### Next Steps

- **Contact the Facility:** Within a few weeks of receiving your results, reach out to the facility to schedule your experiment. During this conversation, inquire about any updates on equipment or capabilities, as these changes may impact your experimental setup. Staying informed is key to anticipating and addressing potential challenges.
- **Collaborate with Your Team:** Connect with your collaborators and co-proposers to develop a more detailed plan and timeline, ensuring that everyone is aligned on objectives and responsibilities. This stage is crucial for transforming your proposal into a workable reality.
- **Plan Simulations:** Consider planning and setting up any simulations you want to conduct before the experiment. This can enhance your preparedness and help clarify logistical requirements.

### **Prepare for the Experiment**

Develop a prioritized checklist of tasks leading up to the experiment. Address essential questions, such as those listed below:

- Do you need to build or modify existing diagnostics?
- Are there components that need design or machining?
- Do you need to conduct any preliminary tests?
- Will you work with the facility on new configurations?

Identify dependencies to ensure timely delivery and utilize project management tools, such as Trello or Microsoft To-Do, to organize tasks effectively. Regular status meetings can help your team stay aligned and proactive.

Maintain continuous communication with the facility. Schedule two critical planning meetings:

### 1. First Meeting (at least 6 Months Before)

- Often referred to as a readiness review.
- Present your experimental idea.
- Discuss detailed setup requirements and hardware needs.

### 2. Second Meeting (1 Month Before)

- Confirm all logistics and finalize requirements.
- $\circ$   $\,$   $\,$  Plan a lab tour for your arrival day to assess the status of your setup.

By fostering collaboration and staying organized, you can overcome challenges and set the stage for a successful experiment!

### Conclusion

Embarking on an experiment at LaserNetUS is a gratifying venture. Remember, learning and adapting are key components of the scientific process. Good luck with your experiment, and continue to push the boundaries of discovery!