
1 L3S Mentoring Guidelines

1.1 Introduction

One of L3S's strategic advantages is the possibility for PhD students to take over responsibility for cutting edge research topics already at an early stage. This provides valuable research expertise for each Ph.D. student as well as a good publication record for each L3S researcher. It is one of the major goals of L3S as a high quality research center that each researcher should co-author two to three quality papers per year on average (based upon DBLP and similar listings), and aim at one top conference in the respective area of research per year (see for example the Australian CORE Ranking and its A* list of top conferences for major computer science research areas).

The high level of research is facilitated by a variety of interesting, innovative and international research projects at L3S as well as by L3S's innovative mentoring program. Within our mentoring program, all PhD students have, in addition to their affiliation with a full-time faculty member as Ph.D. advisor, an experienced postdoctoral researcher as personal mentor who supports their work and personal progress. Through their publications, presentations and discussions, Postdocs aim to give PhD students a first impression of interesting research topics. In personal discussions, the mentor will provide basic advice in the beginning: how to perform scientific research, how to cooperate with other researchers, where and how to find related information about a research area, what promising topics to explore in the PhD student's and project's area of interest. As the student's knowledge progresses, advice includes how to write high quality scientific publications (including knowledge on a technical level), which venues to choose for specific publications, how to structure research work and present results in scientific talks or to a broader public, and how to write proposals for research grants.

L3S has attracted a large number of researchers on Postdoc level who already have a good research record and can serve as points of contact for their research topics. They are managing research projects and research work, and interact both among themselves as well as with Ph.D. students. Beyond project work, they provide advice on Ph.D. student's research throughout their Ph.D. program. This has advantages for both Ph.D. students and Postdocs:

- For the PhD student, continuous exploration of a research area leads to a consistent research record, together with his/her mentor. A weekly meeting (in smaller or larger reading and working groups) will (especially for new students) provide orientation, foster the student's development and provide valuable advice and scientific input.
- For the Postdocs giving advice as mentors the possibility to propel his/her research topic in cooperation with motivated and distinguished PhD students is a valuable asset, especially when aiming at a later career as a university professor.

1.2 Choice of Mentor

Once a Ph.D. student enters L3S, he or she will be assigned a postdoctoral researcher as mentor. In most cases this will be the leader of the project on which the student will spend most of his/her time and effort, to ensure sufficient overlap between the project-related tasks and the actual Ph.D. research, but also might be another Postdoc with the most relevant research background for the student's research interests. The aim is for the Ph.D. student to have the same mentor throughout his or her Ph.D. program, providing continuous mentoring and feedback.

1.3 General Mentoring Responsibilities

Successful mentoring builds on discussion, collaboration and joint research work:

- Mentoring includes advice on research ideas, papers and talks, up to the final Ph.D. thesis itself. It provides input on research questions, strategy and publications, and involves collaboration on scientific publications.
- The mentor will invest time and effort in the Ph.D. student. How much time that is depends on the student and the stage of research, but the Ph.D. student usually will claim several hours a week of the mentor's time and regular meetings to discuss his/her research. Mentoring also includes informal discussions; many worries and issues are better discussed during a coffee break.
- Besides regular weekly meetings between PhD student and Postdoc, there will also be regular meetings with PhD student, Postdoc and the faculty member acting as Ph.D. advisor, to discuss research ideas and strategies and to assess progress and results. Discussions in larger groups on common research interests and papers, reading groups on new topics, relevant background papers and project ideas, as well as research seminar and info lunch talks complement these meetings.
- Mentoring can also involve the organization of seminar events on interesting topics, papers or research areas, or events aimed at improving presentation and communication skills. In these events, mentors also provide feedback to research seminar presentations and talks. Mentors play an active role at annual L3S Research Workshops, suggesting interesting research questions as well as relevant background material, and provide important input to discussions on these research topics.
- Mentoring relationships usually start in the context of a specific research project, where Postdoc and Ph.D. work together, but will remain stable also beyond projects, until graduation of the Ph.D. student. Progressing through the Ph.D. program, Ph.D. students will learn to work independently, still often working together with their mentor and other colleagues, until they finally will be able to work as mentors themselves, and provide valuable advice to their younger colleagues.

1.4 Ph.D. research and Project Tasks

Usually there will be substantial overlap between project work and the student's Ph.D. research. However, project work also includes tasks not directly related to this research work, and the mentor will ensure that the student is able to spend sufficient time on his/her Ph.D. research. The student should inform the mentor or Ph.D. advisor if he or she thinks this is not the case, and appropriate solutions will be found.

1.5 Ph.D. Thesis Schedule

L3S aims at a four to five year schedule for the Ph.D. thesis. In the first year, the student gets involved with a research area and becomes familiar with the state of the art, already doing joint research with the mentor. During the second and third year, the student will pursue his/her own research and publish results more independently. The fourth year will include continuation of this research work as well as write-up and defense of the thesis. The following paragraphs provide a rough outline of the Ph.D. process.

1.5.1 Year 1

The goals of the Ph.D. student for the first year include learning basic research skills (research methods, writing publications, etc.), getting familiar with the research area, and getting acquainted with all relevant research work / publications. At the end of the first year the Ph.D. student should be able to write a research plan for his/her thesis, called thesis exposé.

The tasks of the mentor include introducing the Ph.D. student to the important publications in the chosen area, to offer the student opportunities for participation in research and publication work, and to give the student feedback to improve writing and presentation skills.

The Ph.D. student is expected to conduct the following work:

- give one or two presentations of significant state of the art publications in the L3S research seminar or other meetings
- write a state of the art summary for the research area, also provided for other students in the group
- contribute to and publish conference publications initiated by and in collaboration with the mentor
- publish a workshop paper as leading author at a relevant conference

At the end of the first year, it is the responsibility of the Ph.D. student in tight cooperation with the mentor to come up with a research proposal. This proposal is meant for internal use, as a means for guarding the student's progress. By approving the research proposal, the mentor and the Ph.D. advisor acknowledge the relevance of the research topic and the viability of the research plan. After agreement on the research proposal, all parties are responsible for the Ph.D. student's progress. Over the course of the Ph.D. study, the research plan will be reflected upon and updated as necessary.

1.5.2 Year 2

In the second year, the Ph.D. student continues to collaborate closely with the mentor, and initiates own independent research. Another useful way to get external feedback on his/her research plan and strategy is to submit the research plan to a Ph.D. workshop of a leading conference. First significant results for the Ph.D. thesis will be published in conference papers and possibly workshops.

The mentor provides advice on research methods, regularly gives feedback on research results and progress, and often collaborates with the student in paper writing.

1.5.3 Year 3 and 4

After two years of research, the Ph.D. student will be able to conduct independent research. He/she will be able to initiate and publish core thesis contributions to good conferences and possibly journals in year 3 and 4, still collaborating with the mentor as well as with other Ph.D. students and Postdocs.

In year 4, the Ph.D. student starts preparing the Ph.D. thesis. Both mentor and Ph.D. advisor will give feedback on the outline of the thesis and on individual chapters. The mentor will also help the student in case of difficulties in writing the thesis, and provide feedback on a semi-final version of the thesis, before it is given to the supervisor and sent to the committee. Finally, the mentor will support the student in preparing the thesis talk and defense.

1.6 Heilmeier's Catechism

Whether you are a Ph.D. student, postdoctoral researcher, research group leader or professor, you are sometimes confronted with questions like "Am I working on the right problem, in the right way?", "Does my research proposal make sense?" or similar.

George Heilmeier (ex ARPA director, then TI, GE, Aero, Bellcore, †2014) used a set of questions to evaluate research proposals, similar to the following ones (adapted from [Gio Wiederhold](#), see also [his version](#)):

1. What is the problem, why is it hard?
2. How is it solved today?
3. What is the new technical idea; why can we succeed now?
4. What is the impact if successful?
5. How will your research work / research project be organized?
6. How will intermediate results be generated?
7. How will you measure progress?
8. How long will it take, what will it cost?

They might be useful also for you, even [if you want to build your own startup](#).
