Ph.D. Research Proposal

Doctoral Program in Information Science and Technology
<Area of Ph.D. Research Proposal>

<Title of your Ph.D. Research Proposal>

<Complete Name of Candidate>
<email address of candidate>

Advisor(s):
<name of advisor>
<name of advisor>

<date of submission>
Department of Informatics Engineering
Faculty of Sciences and Technology
UNIVERSITY OF COIMBRA

Abstract

The abstract is a brief summary of your Ph.D. Research Proposal, and should be no longer than 200 words. It starts by describing in a few words the knowledge domain where your research takes place and the key issues of that domain that offer opportunities for the scientific or technological innovations you intend to explore. Taking those key issues as a background, you then present briefly your research statement, your proposed research approach, the results you expect to achieve, and the anticipated implications of such results on the advancement of the knowledge domain.

To keep your abstract concise and objective, imagine that you were looking for financial support from someone who is very busy. Suppose that you were to meet that person at an official reception and that she would be willing to listen to you for no more than two minutes. What you would say to that person, and the pleasant style you would adopt in those two demanding minutes, is what you should put in your abstract.

The guidelines provided in this template are meant to be used creatively and not, by any means, as a cookbook recipe for the production of research proposals.

Keywords

This section is an alphabetically ordered list of the more appropriate words or expressions (up to twelve) that you would introduce in a search engine to find a research proposal identical to yours. The successive keywords are separated by comas.

Table of Contents

Chapter 1
Introduction

The introduction gives an overview of the research project you propose to carry out. It explains the background of the project, focusing briefly on the major issues of its knowledge domain and clarifying why these issues are worthy of attention. It then proceeds with the concise presentation of the research statement, which can take the form of a hypothesis, a research question, a project statement, or a goal statement. The research statement should capture both the essence of the project and its delimiting boundaries, and should be followed by a clarification of the extent to which you expect its outcomes to represent an advance in the knowledge domain you have described.

The introduction should endeavour, from the very beginning, to catch the reader's interest and should be written in a style that can be understood easily by any reader with a general science background. It should cite all relevant references pertaining to the major issues described, and it should close with a brief description of each one of the chapters that follow.

Many authors prefer to postpone writing the Introduction till the rest of the document is finished. This makes a lot of sense, since the act of writing tends to introduces many changes in the plans initially sketched by the writer, so that it is only by the time the whole document is finished that the writer gets a clear view of how to construct an introduction that is, indeed, compelling.

Chapter 2
State of the Art

The *State of the Art*, also known as the *Literature Review* (or *Foundations*), serves a cluster of very important aims. First of all, it demonstrates that you have built a solid knowledge of the field where the research is taking place, that you are familiar with the main issues at stake, and that you have critically identified and evaluated the key literature. On the other hand, it shows that you have created an innovative and coherent view integrating and synthesising the main aspects of the field, so that you can now put into perspective the new direction that you propose to explore. The *State of the Art* must give credit to the authors who laid the groundwork for your research, so that when, in the following chapter, your research objectives are further clarified, the reader is able to recognise beyond doubt that what you are attempting to do has not been done in the past and that your research will likely make a significant contribution to the literature.

The *State of the Art* is usually the more extensive part of a research proposal, so it will expectedly develop over various paragraphs and sub-paragraphs. It should be accompanied by comprehensive references, which you list at the end of the proposal. Ideally, all influential books, book chapters, papers and other texts produced in the

knowledge domain you are exploring which are of importance for your work should be mentioned here and listed at the end of the proposal. You should follow very strictly the appropriate referencing conventions and make sure that no document you refer to is missing in the final list of references, nor vice versa. The choice of referencing conventions may depend on the specific field where your research is located. Popular conventions are those established by the Association for Computing Machinery (ACM), the Association for Information Systems (AIS), the Institute of Electrical and Electronics Engineers (IEEE), and the American Psychological Association (APA).

1.1. First paragraph

1.1.1.   First sub-paragraph of first paragraph

As the *State of the Art* is likely to extend for some pages, it may need to be split into various paragraphs, with appropriate titles, and these paragraphs may need to be broken up further into sub-paragraphs. The paragraphs and sub-paragraphs should comply with the format used here.

1.1.2.   Second sub-paragraph of first paragraph

This is an example of the second sub-paragraph of the first paragraph of the introduction.

1.2. Second paragraph

1.1.3.   First sub-paragraph of second paragraph

This is an example of the first sub-paragraph of the second paragraph of the introduction.

1.1.4.   Second sub-paragraph of second paragraph

This is an example of the second sub-paragraph of the second paragraph of the introduction.

Chapter 3
Research Objectives and Approach

The chapter *Research Objectives and Approach* clarifies the research objectives of your project, taking as its background your description of the state of the art, and describes the methodological approaches you have in mind to face the key research challenges of your project. The clarification of the research objectives should build solidly on the *State of the Art* and relate your research to the work carried out by others. It should elucidate the measure to which your work develops from their work and the extent to which it diverges from theirs to open up new and yet unexplored avenues. In essence, the chapter *Research Objectives and Approach* explains what you plan to do to tackle your research problem, why you plan to do it that way, and how you are going to do it.

The "how to" component of the proposal is called the *Research Methods*, or *Methodology*, component. It should be detailed enough to let the reader decide whether the methods you intend to use are adequate for the research at hand. It should go beyond the mere listing of research tasks, by asserting why you assume that the methods or methodologies you have chosen represent the best available approaches for your project. This means that you should include a discussion of possible alternatives and credible explanations of why your approach is the most valid.

Chapter 4
Current Work and Preliminary Results

This chapter of the research proposal gives a concise outline of the work you have carried out so far and of the progress you have made toward the aims of the project. You should concentrate on the parts that contribute specifically to the goals of the proposal, avoiding detailed descriptions of digressions you may have attempted in the earlier, more exploratory, phases of your work. If you have already obtained preliminary results, this is the chapter where you should provide them, in a structured manner that helps supporting the rest of the proposal.

Chapter 5
Work Plan and Implications

Not all research proposals lend themselves easily to the creation of detailed work plans. In some cases, namely when the work fits the broader plans of a research group that is progressing steadily, it is possible do build a detailed description of what the researcher plans to do (literature to explore in depth, principles or theorems to formulate and prove, experiments to carry out, sub-systems to build, systems integrations to perform, tests to accomplish). In these cases, it is possible, and desirable, to establish specific milestones and timelines and a Gantt diagram. The plan should anticipate the problems likely to be found along the way and describe the approaches to be followed in solving them. It should also anticipate the conferences and journals to which the work in progress is expected to be submitted along the way, and schedule it in a *Goals for Publication* section of the work plan.

In other cases, when the topic to be researched is exploratory and elusive, or when the research approach establishes that each step should build on the, still unanticipated, results of previous steps, it may be impossible to work out a detailed plan. Even in these cases, however, it is advisable to establish a section on *Goals for Publications* that gives a rough schedule of the publications to be produced (submission to the doctoral consortium of a top conference, submission to a national conference, publication in a secondary journal, submission to a reputable international conference, submission to the top conference or top journal in the field). In spite of its contingency, this list may work marvels in keeping the researcher focused, motivated and beneficially under pressure.

Whatever its nature, comprehensive or sketchy, your work plan should be able to put in perspective the implications of the successive steps of your work, reinforcing, in the mind of the reader, the conviction that your approach is solidly oriented toward results, that the topic is timely and relevant, and that the outcomes of the project will contribute significantly to the enhancement of the field.

Chapter 6
Conclusions

The *Conclusions* briefly restate the objectives of your research project, recap the research approach you plan to follow, and clarify in a few words what you expect to find out, why it is scientifically valuable to find it out, and on what basis you expect to evaluate the validity of your results.

References

In this section you should list all the references you have made throughout the research proposal, making sure that you comply with the referencing conventions or citation styles that have been established for your specific field. The subject of referencing conventions is a fundamental one, requiring extensive discussion, so it will be dealt with elsewhere. To satisfy your curiosity for the time being, you may find hints on the ACM requirements at http://www.acm.org/pubs/submissions/submission.htm and look up examples of the differences between the conventions of the ACM, APA, and IEEE at http://www.library.dal.ca/subjects/csci_ref.htm. Bellow, you are given a few examples of citations complying with the requirements of the ACM

An article in a journal:

ABDELBAR, A.M., AND HEDETNIEMI, S.M. 1998. Approximating MAPs for belief networks in NP-hard and other theorems. Artificial Intelligence 102, 21-38.

A book:

GINSBERG, M. 1987. Readings in Nonmonotonic Reasoning. Morgan Kaufmann, Los Altos, CA.

A chapter in a book:

GREINER, R. 1999. Explanation-based learning. In The Encyclopedia of Cognitive Science, R. WILSON AND F. KEIL, Eds. MIT Press, Cambridge, MA, 301-303.

An article in conference proceedings:

MAREK, W., AND TRUSZCZYNSKI, M. 1989. Relating autoepistemic and default logics. In Proceedings of the 1st International Conference on Principles of Knowledge Representation and Reasoning, Toronto, Canada, May 1989, H. BRACHMAN AND R. REITER, Eds. Morgan Kaufmann, San Mateo, CA, 276-288.