The University of the Future

ACCRA INSTITUTE OF TECHNOLOGY

THE FRANCIS ALLOTEY GRADUATE SCHOOL

Office of Graduate Studies

THE PHD RESEARCH PROPOSAL TOOLKIT

Preamble

The Philosophy of Scientific Research

What is Scientific Research?

A piece of scientific research will normally involve a scientific investigation aimed at coming out with some answers or solution to an identified research problem.

The actual process of conducting the research may or may not follow a particular research methodology, method or procedure. It may however involve the use of appropriate tools, or techniques.

The Classification of Research

'Means-to-an-End' Type of Research

'An-End-in-Itself' Type of Research

Basic Research vrs. Applied Research

Other Types of Classification

- Experimentally-based Research
- Non-experimentally-based Research
- Survey-type Research
- Field Research vrs. Desk Research
- Action Research
- Case-Study Type Research
- Degree-related vrs. Non-degree related

Stages of a Research Exercise

Stage One: Writing the Research Proposal

Stage 2: Conducting the Research Proper

- Conceptualizing the Research Problem
- Re-focusing Problem Area to be Researched
- Conducting Relevant Literature Review of Earlier Works
- Identifying Relevant Techniques/Methods to be used

- Familiarizing with adopted Techniques/Methods or Procedures/Concepts
- [Doing Experimental Design]
- [Doing Data Collection]
- [Conducting Lab. Experiments & Analysis of Results]
- [Carrying-out Analysis, Specification, Design, Implementation and Testing of System]
- [Demonstration/Evaluation of Study Results]

Note: [....] = Optional

Stage 3: Writing-up the Research Document

- A Research paper (published/unpublished)
- A Discussion/Technical Document
- A Research Report
- A Thesis/Dissertation

Writing the PhD Research Proposal

What is a Research Proposal?

A *Research Proposal* is a document spelling out **what** you intend to do, **why** you want to do it, **how** you intend to do it, **what** you expect to get out of the research exercise, its significance and possible use.

A number of potential PhD students and beginning researchers do not fully understand what a research proposal means, nor do they understand its importance. To put it bluntly, one's research is only as good as one's proposal.

An ill-conceived proposal dooms the research project even if it somehow gets through the relevant PhD Research Committee (PRC).

A high quality proposal, on the other hand, not only promises success of the research exercise, but also impresses the PRC about your potential as a researcher and a PhD candidate.

A research proposal is often developed by beginning with the following considerations:

- What is the central question I wish to address?
- What kinds of answers am I looking for?
- What methods will help me find the answers?
- What is the relationship between my central question and current work in the discipline/subject/area?
- Am I sufficiently interested in this research topic or question to sustain my engagement with it over a prolonged period of study?
- What kinds of benefits, personally, intellectually, or professionally, might derive from my research?
- What specific contributions will my research make to the body of knowledge in my field or domain of study?

In the final analysis, you need to bear in mind that a research proposal is intended to convince others that you have a worthwhile research project and that you have the competence and the work-plan to complete it.

Generally, a research proposal should contain all the key elements involved in the research process and include sufficient information for the readers to evaluate the proposed study.

Regardless of your research area and the methodology you choose, all research proposals must in the end address the following questions: ***What you plan to accomplish, why you want to do it and how you are going to do it.***

The Research Area Identification: Some Basic Questions

- Will the subject/area sustain your interest in the research?
- Is the research within your area of competence?
- Is the area researchable, i.e. Can the area be researched or investigated?
- How practical and feasible is the intended area of research?
- Will the research lead to clearly identifiable deliverables?
- Questions relating to the significance of the research?
- Is the research manageable?
- Will the output of the research meet the requirements of the PhD degree in terms of relevancy and level?
- Uniqueness, Originality Requirement: Uniqueness in terms of the approach used, area explored, subject matter, solution, etc.

The PhD Research Focus

A PhD research/study may be designed to:

- EXPLORE: a concept, a theory, an idea, or an area
- EXPLAIN: a concept, a theory, the behaviour or operation of a system, a mechanism or a phenomenon
- DESCRIBE: a concept, system, process or phenomenon
- PROOF: a theory, a concept, or a hypothesis
- CONCEPTUALIZE: a system, a process, a model, procedure or a mechanism
- DESIGN: a process, a system, a procedure, or a model
- EXAMINE: a concept, a process, a system, procedure or a mechanism
- DEVELOP: a concept, a procedure, a model, an approach, an algorithm, a system, an architecture or a product
- BUILD: a system, a physical unit/model, a mathematical model or a working model of a system
- IMPLEMENT: a system, a process, a model, procedure, a concept, a theory, an idea or a mechanism
- DEMONSTRATE: a concept, a theory, an idea, a system, a process, a model, procedure or a mechanism

The PhD Research – Potential Outcomes

The outcome of a PhD research work may:

- Open up new a area
- Provide unifying framework
- Resolve long-standing question
- Thoroughly explore an area
- Contradict existing knowledge
- Experimentally validate a theory

- Produce an ambitious system
- Provide empirical data
- Derive superior algorithms or systems
- Develop a new methodology or mechanism
- Develop a new tool or system
- Produce a negative result
- Create room for further research work in the subject area

Developing a Good PhD Research Proposal/Outline: Some Pointers

"A good thesis proposal hinges on a good idea. "A clean, well thought-out, proposal forms the backbone for the thesis itself.

"A research proposal sets out the **broad topic you would like to research** (*substance*), **what the research would set out to achieve** (*aims and objectives*), **how you would go about researching it** (*methodology*), **how you would undertake it within the time available** (*outline plan*) and **what the results might be in relation to knowledge and understanding of the subject** (*potential outcomes*)

"Your research proposal frames your original idea, locates it, delimits it and specifies not just what you are studying but how you will actually carry it out and what you might find".

"A research proposal basically lays out your ideas and intentions in a clear, concise manner."

"A PhD is an original piece of research and so you should demonstrate that your proposed area has not been studied before."

"The process of developing the proposal can be a valuable exercise, one which can help you determine your focus, clarify what is involved in your research project and plan its development.
"A developed proposal is an important way in which you can demonstrate your understanding of research and communicate your 'research thinking' to others".

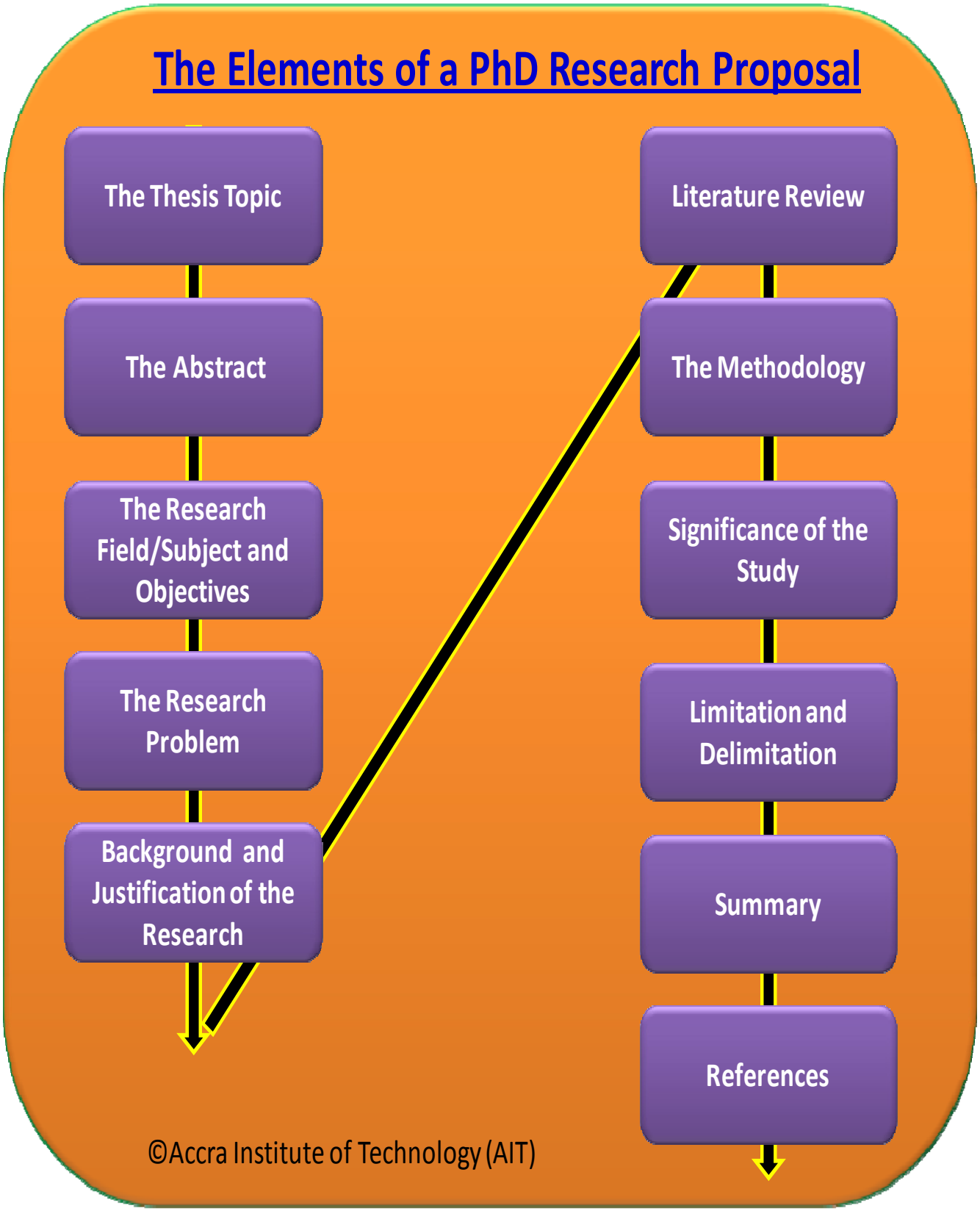
"It is the merit of the proposal which counts, not the weight. Shoot for up to five pages that indicate to a relatively well-informed audience that you know the topic and how its logic hangs together, rather than fifteen or twenty pages that indicate that you have read a lot of things but not yet boiled it down to a set of prioritized linked questions."

"The research proposal should situate the research work in the relevant body of knowledge of the subject matter, it should show why this is an (if not the most) important research problem to answer in the field, and convince the research committee (the skeptical readers that they are) that your approach will in fact result in an answer to the stated research problem".

Finally, in developing a research proposal it is useful to remind yourself of what the examiners will be looking for in the final thesis when you have completed it.

In a good thesis the following elements can be traced back to the research proposal:

- A distinct contribution to knowledge
- Evidence of the discovery of new knowledge or the exercise of independent judgement
- Literary presentation
- Original work of merit worth of publication
- Evidence of competence in independent research
- Understanding of concepts, issues, techniques and methodology
- Critical use of published work and source materials.



Writing the PhD Research Proposal: An Outline

1.0 The Thesis Topic

A **title page** should include your proposed thesis **topic** (or title), your full **name** and **qualifications** (e.g. Akosua Mensah, BSc, MBA), your AIT **School** (e.g. AIT Business School [ABS]; Advanced School of Systems and Data Studies [ASSDAS]; School of Advanced Technologies, Engineering and Science (SATES]) and the **date** of submission.

The research topic should be concise and descriptive. For example, phrases like:, *"An investigation of . . ."* ; *"Research on….."; "Studies on….." etc*. could be avoided.

If possible, think of an informative but catchy title. An effective title not only generates the reader's interest, but also predisposes him/her favourably towards the research proposal.

In composing your topic be also mindful that a requirement of a PhD thesis is that it makes an original contribution to knowledge.

Thus, you need to show how the proposed research topic is sufficiently important to justify your efforts (and the efforts of those you involve in your research).

2.0 Abstract

An **abstract** that, in one or two paragraphs, provides a concise summary of the research work you are proposing including: *a brief statement of the problem that you are trying to solve and how you expect to solve it*.

This is one of the most challenging parts of the proposal to write since you must provide some detail without the reader having yet been given the background knowledge. It is probably best to write the abstract last!

3.0 The Research Field/Subject and Objectives

A statement of the **field** and **subject area** of focus of the research followed by the **general/global objectives** and the **specific objectives** of the study.

3.1 Field and Subject of Study

For example, the ***field*** of study could be *Information Technology* and the ***subject*** area of focus could be: *Distributed Systems, E-government Systems, Database Systems, Artificial Intelligence/Knowledge-based Applications Systems*, *Information Security*, etc)

3.2 General and Specific Objectives

The ***General/Global Objective*** should state the expected contribution of the research to the general body of knowledge in the subject area.

For example, you could have a statement like*: "The general objective of the proposed research is to contribute to the general body of knowledge and research work in the area of the application of artificial intelligence to support medical diagnosis"*

The ***Specific Objectives*** should state how specifically the general objectives will be achieved. It could start with the statement…*To achieve the general objectives, the research will be aimed at addressing the following specific objectives: ..* [bulleted list/brief statement or description of the specific objectives..]

Key points to keep in mind when preparing a study objective(s) statement:

- The study objective(s) should provide a specific and accurate synopsis of the overall purpose of the study. If the purpose is not clear to the writer, it cannot be clear to the reader.
- Try to incorporate a sentence(s) that begins with *"The general/specific objective(s) of the study is . . ."* This will clarify your own mind as to the purpose and it will inform the reader directly and explicitly.

- Clearly identify and define the central concepts or ideas of the research. When using terms, make a judicious choice between using descriptive or operational definitions.

4.0 The Research Problem

A concise **research problem** statement that, in one to three sentences, describes specifically *what the problem is that you intend to solve*. It explains *what problems or issues you wish to explore and why you wish to explore them*.

This problem statement can be technical in nature. For example, ***"Intend to explore the benefits and liabilities of fuzzy logic in the scheduling of work across heterogeneous distributed computing environments."***

Please note that the word 'problem' is intended to be interpreted broadly. It is entirely possible that your 'problem' might be less specific in nature. For example, ***"Intend to develop and empirically test a tool for integrating database schemas."***

Do note that if the research problem is framed in the context of a general, rambling literature review, then the research problem may appear trivial and uninteresting.

However, if the same research problem/question is placed in the context of a very focused and current research area, its significance will become evident.

Try to place your research problem within the context of either a current "hot" area, or an older area that remains viable. Secondly, you need to provide a brief but appropriate historical backdrop.

Thirdly, provide the contemporary context in which your proposed research problem occupies the central stage. In short, try to paint your research question in broad brushes and at the same time bring out its significance.

You should also provide a brief description of the research problem. In other words, you will need to convince the PhD Research Committee that you have thought of all the details of the research problem (and the environment(s) in which it occurs) that might affect your proposed solution.

The research problem description further convinces the committee that you know what you are talking about and will therefore be capable of undertaking your proposed research work.

Some Pointers on Composing the Statement of the Problem

"The research problem statement describes the context for the study and it also identifies the general analysis approach"

"A research problem might be defined as the issue that exists in the literature, theory, or practice that leads to a need for the study."

"It is important in a proposal that the research problem stands out—that the reader can easily recognize it. Sometimes, obscure and poorly formulated problems are masked in an extended discussion. In such cases, reviewers and/or committee members will have difficulty recognizing the problem."

"A research problem statement should be presented within a context, and that context should be provided and briefly explained, including a discussion of the conceptual or theoretical framework in which it is embedded."

Clearly and succinctly identify and explain the problem within the framework of the theory or line of inquiry that undergirds the study. This is of major importance in nearly all research proposals - quantitative research and qualitative research."

"State the research problem in terms intelligible to someone who is generally sophisticated but who is relatively uninformed in the area of your investigation."

"Effective problem statements answer the question *"Why does this research need to be conducted?"*

If a researcher is unable to answer this question clearly and succinctly, and without resorting to hyper-speaking (i.e., focusing on problems of macro or global proportions that certainly will not be informed or alleviated by the study), then the statement of the problem will come off as ambiguous and diffused"

5.0 Background 'Current Status' and Justification of the Research

The research background statement among other things should include:

- a description and explanation of the significant/topical background issues (historical, current) and sub-issues pertaining to your proposed research – including identifying the discipline and describing why you are doing the proposed research work, given the background issues
- description of the current state of art and the current status of the relevant body of knowledge in relation to the proposed research;
- statement as to why the research is needed, how would the results of the proposed research fill this need and be beneficial; and what its significance is. (i.e. does anyone else care about what you are doing? – the justification of the research work).

You also need to provide a quick sketch of your proposed solution and briefly explain how it differs from other works. Be sure to build from more general concepts to more specific ones so that the reader will understand everything.

*The background to the research section should also provide a **brief** statement on related work - commenting on previous work related to what you are proposing.*

This section should be carefully written and organized to make the relationships between the earlier research efforts clear and to also explain how that research relates to your proposed work.

6.0 Literature Review: Detailed Review of Previous Work

A literature review (i.e. review of relevant previous work) is expected to involve accessing a selection of relevant previous work, resources and materials with a strong relation to the research topic in question, accompanied by a description AND a critical evaluation/critique and comparative analysis of each work. It is NOT a summary of available materials without any critical description.

The review of relevant previous work is expected to be comprehensive including a detailed documentation of significant prior research that should be comprehensive enough to demonstrate that you are aware of the major relevant sources of information.

Most research projects arise out of considerable prior research, which should be summarized. *You need to show the relationship between your research problem and this prior research and show where gaps exist in the knowledge area and by extension show how your work will fill this gap and by so doing make a unique/original or significant contribution to the body of knowledge/field of study in question.* A PhD is an original piece of research: and so you should try to explain what you think might be original about your proposed research using the review of previous work as your point of reference.

The literature review exercise should among other things:

- review and document the results of other studies that are closely related to the proposed study

- relate the proposed research to the larger, ongoing dialogue in the literature about a topic, filling in gaps and extending prior studies and work
- provide a framework for establishing the importance of the study, as well as a benchmark for comparing the results of the proposed study with other previous findings.
- demonstrate that you have a comprehensive grasp of the field and are aware of important recent substantive and methodological developments.
- show how that the proposed study will refine, revise, or extend what is now known
- provide a rationale for the proposed research work and demonstrate its lineage to existing knowledge, previous investigations, contemporary practice;
- identify significant prior research questions and explain whether these questions have been asked before, and what answers have been obtained - i.e. outline, evaluate and synthesize current state of critical/ theoretical debate;
- identify limitations of past/ current research, and explain your point of entry into the debate (identify gaps/ misinterpretation/ errors/ contradictions/ particular critical or theoretical problems);
- explain how you will build on past strengths while overcoming limitations;
- identify potential outcomes of the proposed research and the importance of each;
- spell out key assumptions of proposed research and identify the limitations of research project: "This research will not.,."
- explain why the proposed research is worthwhile and necessary;
- explain what original contribution the proposed research will make to knowledge

The previous work you reference should be relevant and recent. Insufficient references suggest that you may not be aware of all the related work and this means that it is possible that your work may already have been done by someone else.

The inclusion of irrelevant (or too many) references may lead the PhD Research Committee (PRC) members evaluating your proposal to question your understanding of the area.

Finally, lack of recent references might suggest that your proposed work is no longer of interest or is, perhaps, too hard a problem that other researchers have chosen to overlook.

Finally, do base your related work on quality publications. Your referenced papers should be from well-respected, refereed sources (i.e. journals or top tier conferences in your selected area).

Referring to dubious papers lessens the committee's confidence in your thesis proposal. Finally, your selected papers should reflect a reasonable amount of breadth in terms of authorship and source.

[Note: Please refer to Additional Notes/Resources for Guidance on how to write your literature review section of your Research Proposal]

7.0 The Methodology

The Methodology section is very important because *it documents how you plan to tackle your research problem*. Depending on the nature and the underlying methodological approach to be adopted for the proposed research work the followings may be documented in this section:

Which Research Design and Method

- Indicate which research design is to be adopted/used (if any)
- Is the research QUANTITATIVE or QUALITATIVE in nature in terms of the methodology? Discuss and justify your choice of research method
- Highlight and discuss the relevance of the adopted method to your study
- Describe how the adopted method will be applied

Which Research Format

- Is the research Explorative, Descriptive, Causal or a Case study method?
- Discuss what it is (i.e. provide a theoretical perspective).
- Highlight and discuss the relevance of the format to your study
- Describe how the research format will be applied

Which Techniques/Tools/Approaches/Instrumentation/Devices

- Which techniques, tools/instruments, approaches etc will be adopted and used to develop/produce, present/demonstrate the expected results of the proposed study
- Highlight and discuss the relevance of these techniques/tools/instruments/approaches to your study
- Describe how these techniques/tools/ instruments or approaches will be applied or used

What Data Collection Methods (if applicable)

- Clearly indicate whether you are going to use primary or secondary data
- Indicate what primary or secondary data is (i.e. provide a theoretical perspective).
- Identify the secondary data which you are going to use for your study.

What Population and Sampling Procedures (if applicable)

- Identify and document the population or reference for the study. If there are different components of the population, clearly indicate this
- Discuss the various sampling frames, types and techniques that will be adopted including an indication of the type of statistical data analysis that will be carried out to analyze the results

On the whole the guiding principle for writing the methodology section is that it should contain sufficient information for the reader to determine whether the methodology is sound. It may well be the longest section of your proposal and should be made up of the following sub-sections:

Solution Strategy/Approach*:** A description of your proposed ***solution strategy/approach or method and expected results.

Although you may not know the precise details of how you will solve the research problem, you should be able to give the committee sufficient detail to convince them that what you are proposing is a good idea that can be done within the time constraints of a PhD degree and that you understand the issues associated with the techniques you intend to apply.

In particular, you should be able to describe how your proposed solution strategy or approach/method will address the details of the problem and environment described in the previous section of your proposal.

You should also realistically summarize what you see as the advantages and disadvantages of your proposed approach/method and, accordingly, what you expect the results of your work to be.

Evaluation of Research Work: A description of how you propose to undertake the ***evaluation*** of your work. You must ultimately be able to answer the question of whether or not the work you have proposed and (later) completed is important.

This is often done by direct comparison with other, existing work in the field. Such comparisons may be done experimentally, analytically, through simulation or possibly a combination of these.

For example, you might be proposing a thesis where, at the end, you will want to compare the performance of an algorithm you developed and implemented with the performance of a similar existing algorithm. When doing this, always try to make the comparison(s) as objective and meaningful as possible.

8.0 Significance of the Study

On documenting the significance of the research you will need to indicate *how your research will refine, revise, or extend existing knowledge in the area under investigation. Note that such refinements, revisions, or extensions may have either substantive, theoretical, or methodological significance*.

The documentation of the significance of the study should among other things address the following questions:

- What specific significant unique/major contributions that the proposed research work will make to the area/body of knowledge?
- What will the expected results/outcome of the proposed research mean to the theoretical framework that framed the study?
- What will be the practical implications/use (if any) of the expected results/outcome of the proposed research work?
- How will the expected results/outcome of the study be implemented, including a statement on its possible impact and on what innovations will come about through its implementation (if any)?
- What areas/directions of further/subsequent research work are likely to arise from the expected outcome/findings or results of the proposed study?
- What will be improved or changed as a result of the proposed research work?

9.0 Limitation and Delimitation

9.1 Limitation

Document the potential weaknesses or the possible limitations of the expected results/outcome of the proposed study and as well as the limitations of the approaches, procedures, methods etc to be adopted to achieve the expected results of the proposed study. Also to be included are statements relating to issues, factors beyond the control of the study.

9.2 Delimitation

Document how the study will be narrowed in scope, that is, how it is bounded. This is the place to explain the things that you are not doing and why you have chosen not to do them—the literature you will not review (and why not), the population you are not studying (and why not), the areas you will not concern yourself with (and why), the methodological procedures or tools/techniques you will not use (and why you will not use them). Limit your delimitations to the things that a reader might reasonably expect you to do but that you, for clearly explained reasons, have decided not to do.

10.0 Summary

A brief (one to two paragraphs) summary of the research proposal (i.e. the previous sections) that highlights the key points in the proposal and provides a list of contributions to the field that you expect your work to provide.

Be very specific when listing your contributions and explain why they are of interest to the research community in your specific field and subject area of research.

Concluding Remarks

Just keep these points in mind while writing your proposal:

- Include all the above sections.
- Stay focused on your research topic.
- Develop a coherent and persuasive argument for your proposed research.
- Cite major studies in the field and the subject area of research.
- Present theoretical and empirical contributions by other researchers.

11.0 References

A section listing relevant references on which your research proposal is based should be included. Only references cited in the text are to be included in the reference list.

11.0 Appendix

Include appropriate appendices in this section of the Research Proposal

Extracting Specific Chapters of the PhD Thesis from the Research Proposal Document

The contents of the various sections of the PhD Research Proposal developed using the structure and the guidelines provided in this Toolkit can be extracted to compose specific chapters of the PhD Thesis as illustrated below. Candidates are therefore required to develop their comprehensive PhD Research Proposal with this requirement in mind.