

**Incremental Document Template:
Format and Guidelines To Produce a Successful Manuscript**

05.05.2020, Version 2.0

**Prof. Dr. Mehmet Ufuk Çağlayan
Department of Computer Engineering
Yaşar University, Bornova, İzmir**

About the Incremental Document Template

First, we give a number of hints/notes about why we need to write our research manuscript as an “Incremental-Document-Template” and why we should keep writing an “Incremental-Document-Template” in so many revisions.

In the pages following the hints/notes below, an example “Incremental-Document-Template” is given to describe the format and other details. More hints/notes and examples are also given within the example “Incremental-Document-Template”.

• **Verba volant, scripta manent (Söz Uçar Yazı Kalır)**

- Although the document is called a “template”, it is not actually a template, since a template is usually a kind of “fill in the blanks” type of document, like an application form. This document contains a set of ideas, conventions, rules, guidelines, etc, reflecting the accumulated experiences of MUC, the author of this document, since he started PhD quite long time ago.
- The goal of this document is to help students and/or researchers to produce better manuscripts (technical reports, theses, papers, etc,) in an easier, faster and correct manner.
- This document is also a notebook of your activities while you are carrying out your (MS or PhD) research work, but it is not a laboratory notebook. You should write your lab/experiment/simulation activities elsewhere (in a lab notebook), but you should write your results and result interpretations here in this document.
- Why “incremental”? Analogy is as follows: How do you eat food? Your mother cooks something (e.g. pilav) in a big pot in the kitchen and serves a portion of it, for example for 4 people, from the pot in a service plate at the dinner table (polite service). Then, each person at the table gets some amount from the service plate to his/her own plate. Finally, each person uses his/her spoon or fork to get a max mouthful amount of food from his/her own plate. Our mouths have a max capacity. So we eat in an “incremental” manner, we do not attempt to put everything in the pot into our mouths..! In some countries, they just skip some intermediate steps and eat directly from the pot by using their hands, but this is still “incremental” with less number of steps. Similarly, you cannot read so many papers, do all your research, experiments, simulations, etc, then you decide you did enough work and sit down to write the manuscript, a thesis and/or a paper, in a single shot. Very bad, if everything was stored in your brain. “I’ve read a paper last year about this xyz issue, which one was that?” Of course you may have kept (actually ,you must definitely do this), a bunch of notes, here and there, hand-written on little pieces of paper or in an A4 notebook with 500 pages or as whole documents in pdf form in your laptop computer, thinking these notes/documents will be necessary to write your manuscript in the future. This document will help you to organize/structure these notes towards a goal (thesis, paper, etc) in a single document and in a cumulative and chronological order.
- Since this document is “incremental”, you are expected to produce many revisions of this document, The number of revisions for MS research work will be much less than the number of revisions for PhD research work, for example, 100 revisions for MS vs 1000 revisions for PhD (I’m not kidding..!).
- A former PhD student Mahir Kutay (currently faculty member at Yaşar University), for whom I was a distant and informal thesis advisor, had a record number of versions (I believe about 68 versions) of a manuscript before he produced his PhD thesis, until now. Most of my former MS and/or PhD students who were not able to finish their thesis research work did not adopt this “incremental” approach and did not produce any manuscripts of any significance.
- Your revisions should normally be cumulative, that is, you rarely delete text in a version while you are producing the next version of the “incremental” document. You may never know which sections/paragraphs of your “incremental” document you will be needing in future.

- You should expect that, when it is time for you to produce your actual thesis or a paper or a technical report, all you need to do is to put the respective (or the last) version of your manuscript into the format desired, by re-organizing/re-structuring manuscript sections, re-phrasing some sentences, getting rid of all unnecessary text/figures etc, In a sense, you start to write your thesis and/or papers at the very beginning of your research work. You must start writing the first version of your manuscript after reading your first paper in the area of your research work.
- Keep all revisions in a system directory and do not forget to back up this directory periodically, not once every year, possibly every 2-to-4 weeks.
- When you start writing the first version of your manuscript, change the filename of the this document to something like “YourNameLastname-research-area-date-version number” and stick to use a consistent file name in all your versions. Use the same date and version format as shown in example formats below Increase version number as (1.0, 2.0, 3.0, etc), instead of (1.0, 1.1, 1.2, 2.0, 2.1, etc), so that yo will know how many versions you have produced during your research work. If you like, you can increment the minor version number, that is, like (1.0, 1.1, 1.2, 1.3, etc) to designate versions intermediately stored for safety of your document.

Examples: MehmetUfukÇağlayan-SecurityModeling-2020-01-04-v1.0
 MehmetUfukÇağlayan-SecurityModeling-2020-03-08-v2.0
 MehmetUfukÇağlayan-SecurityModeling-2020-05-04-v3.0

- Do not think that you write such a manuscript in the “incremental manner” to show your “accountability”, that is, for your advisor, or for your mummy, to prove that you really work in your research area or to document your research activities in a detailed manner for other third parties. No.! You write manuscript in the “incremental manner” really for yourself, and occasionally, that is, when you think you have sufficient progress in your research, to produce an associated technical report, paper, thesis in an easier and faster manner.
- The text in the following sections contain hints/notes and examples that are thought to be important. In many cases, it may not be clear whether you will follow that guideline or not. Just use your brain, check other resources (like papers in prestigious journals, MS/PhD theses from important universities, technical reports from important resources, etc.) decide what to do and go ahead.
- You write this manuscript by using your own sentences and your own words, even if your English or Turkish is broken. You keep writing and you will see that your writing will improve over time. When you look at the version 5 of this document when you are at version 33, you may be loughing at the sentences you have constructed in version 5. This is just normal, since most of us have not been educated to write properly in our K12 education, unless you have attended a school that emphasized proper writing (this is rare anyway. Most of us just received the introductory and simplistic composition education, which instructs that a manuscript is composed of introduction, development and conclusion (Giriş, Gelişme ve Sonuç paragrafları) sections.
- Do not copy/paste sentences, paragraphs, figures, diagrams, tables, etc. from other and publicly available resources, even from your own material. For example, you can not use a paragraph or figure in one of your publications in another publication, unless properly referenced with an explanation why you re-use it. Public does not mean you can make a copy of it and behave as it is yours. If you need copy/paste something from any other source, you must properly give a reference to that source, in fact, in certain copyrighted cases you must get a permission to use the material. Usually, giving a reference is sufficient.

COMP5599 Master Thesis or COMP5699 PhD Thesis
Advisor: Mehmet Ufuk Çağlayan

**A New Approach for Formal Design and Analysis
of Security in Hardware and Software Systems**

05.05.2020
Version 63.0

By: Mehmet Ufuk Çağlayan
Student Id: 1234567890

Version History

Version	Date	Explanation
1.0	28.08.2010	Initial draft of problem definition, motivation and literature survey
2.0	28.09.2010	Literature survey in Related Work chapter is expanded by adding 3 survey papers, 25 journal papers and 48 conference papers. Problem definition and motivation in chapters 1 and 3 are refined.
3.0	15.10.2010	Literature survey in Related Work chapter is further expanded by adding 15 journal papers and 23 conference papers. Problem definition in chapters 1 and 3 is further refined and alternative solutions in chapter 3 are outlined.
4.0	31.10.2010	Literature survey in Related Work chapter is further expanded by adding 2 survey papers, 25 journal papers and 60 conference papers. Problem definition in chapters 1 and 3 is further refined, alternative solutions in chapter 3 are detailed together with their advantages and disadvantages.
5.0	03.11.2010	Literature survey in Related Work chapter is further expanded by adding 2 journal papers and 6 conference papers. Justification for further development of alternative solution 2 among the alternative solutions given in version 3.0 is finalized and the work to be done is detailed together with a roadmap and hardware/software tools required.
.....	It seems that this document has continuously been revised, actually 63 revisions, for almost last ten years now
63.0	00.05.2020	A new case study is added, conclusions section is revised and final copy of the document is produced. Sir: I do not have the patience to further revise this document. You either accept it as my thesis or I quit..!

Table of Contents

Version History	5
Table of Contents	6
Abstract	7
1. Introduction	7
2. Related Work: Overview of Formal Design and Analysis Methods	8
2.1. Related Work: Overview of Formal Design Methods	9
2.2. Related Work: Overview of Software Design Tools	9
3. My/Our Proposal: A new Approach for	9
4. Case Studies: A new Approach for	10
4.1. Case Study 1: Blah, Blah	10
4.2. Case Study 2: Blah, Blah, Blah, Blah, Blah, Blah.....	10
5. Conclusions and Future Work.....	10
References	11

Abstract

Abstract is the shortened version of what you write into the Introduction chapter. It will be the most frequently read portion of your manuscript. If the abstract is unable to identify the problem, the solution proposal and benefits of the solution in an attractive manner, almost no one (except perhaps your jury members) will read the rest of your manuscript.

You may attempt to write first the Abstract section then the Introduction chapter/section, or first the Introduction chapter/section then the Abstract section. Both approaches are problematic (Tavuk mu yumurtadan çıkar, yumurta mı tavuktan çıkar?). I suggest you start by writing three sentences, the first sentence about the problem area and the problem itself, the second about your solution proposal and the third the benefits of your solution proposal. In fact, you start to write the introduction chapter in the same manner. When you later finalize your introduction chapter, you can also finalize the abstract in association with the introduction chapter. There will of course be overlaps/repetitions in abstract and the introduction chapter, but this is not a problem, it is expected and acceptable. For example, if you have constructed a very good looking sentence in your introduction chapter, you can copy that sentence into the abstract. Do not attempt to express the same ideas/subjects/whatever with different sentences in the abstract and the introduction chapter.

The abstract must not be very short or very long. One or two paragraphs with 10-20 sentences are usually acceptable. Different universities (regarding MS and PhD theses), journals, conferences/symposia etc will have rules about how long an abstract should be. Read a number of journal and/or conference papers and you will soon get the idea.

1. Introduction

Introduction section/chapter will be the second most frequently examined section of your manuscript. All subsections of the introduction are not equally important. For example, subsections on what the problem is, your contribution to solve the problem and pros and cons of your solution are very important. People will give very much attention to these subsections. Note that these subsections are extensions of related sentences in the abstract and are repetitions in a way.

The following questions need clearly be answered in the Introduction chapter

- i. **What is the general problem area?**
Do not start with “Let there be light..!, i.e. modern computer hardware and software systems date back to Babbage, actually Turks in Central Asia discovered the primitive form of computation devices, Internet is now part of our every day life, etc” kind of sentences. Just write the rather narrow context the problem you attack to solve exists. For example, secure hardware/software systems are important for safety on highways. Secure, trustable computer systems are desperately needed for safe highway navigation, etc.
- ii. **What is the problem?**
Example: The current problem in software engineering is the inability to provide a formal design specification in an acceptable manner so that security properties of any hardware or software system could later be analyzed for the purposes of Common Criteria certification.
- iii. **Since when does the problem exist?**
Example: This is a long time problem with no good solutions at all. The paper (Giovanni 2006) proposed the problem and a solution for it but their solution was not elegant and was not usable due to its $O(n^3)$ complexity. Later, (Ayla 2008) proposed a $O(n^2)$ complexity solution. (Ökkeş 2011) extended the problem with additional requirements but was unable to propose any real solutions, etc.

- iv. **Motivation. Why is the problem so important?**
 Examples:
- Nobody has done it before..!
 - We are the first one to discover this serious problem affecting all animal life and to propose a good solution for this problem.
 - Dr. Caglayan told me that it is important.
 - I do not care whether it is important, I just need to solve it so that I will have a thesis and several journal papers.
- v. **Motivation. What are the benefits of solving this problem?**
 Examples:
- Based on our proposed method of formal design and analysis, it is now possible to certify any software system with respect to Common Criteria Level X.Y+.
 - Anatolian IT companies in Kayseri desperately wait for a solution to this problem to be able to increase their exports to EU hundred times.
 - All humanity will benefit if there is a reasonable solution.
- vi. **Main Contribution of this Work**
 There should be at least one sentence or better one paragraph, starting with “The main contribution of this work,” and clearly identifying the main contribution of this work. For example: The main contribution of this work is a totally new approach for the formal design and analysis of secure hardware and software systems. Our approach is based on the technique originally proposed in (Takayama 2009).
- vii. **What is our method for the solution of this problem?**
What is new in our method for the solution?
What are the benefits of solving this problem by using our method?
Which aspects of our method are different compared to former solutions of this problem?
 Examples:
- We will use Ambient Calculus based formal representation as the basis of our method.
 - Our proposed method X-MUC-136 is a totally new one and is based on extensions of Z.106.
 - We achieved 30% performance increase in secure transaction/min capacity.
 - Based on our proposed method of formal design and analysis, it is now possible to certify any software system with respect to Common Criteria Level X.Y+ in just a few hours.
 - Anatolian IT companies desperately wait for a solution to this problem to be able to increase their exports to EU hundred times.
 - The method proposed in (Hans 2008) actually does not work and no author has proposed a better solution yet.
- viii. **The structure of this manuscript is as follows.**
 This section is also a mandatory one and normally the last paragraph of the Introduction chapter. Probably, not many people read this section, but it must be there for completeness. For example: An overview of work already done by other researchers is given in Chapter 2. Our proposed method is detailed in Chapter 3. Two case studies that reflect the application of our approach are given in Chapter 4. Finally, conclusions and future work are presented in Chapter 6.

2. Related Work: Overview of Formal Design and Analysis Methods

This section/chapter should give a comprehensive literature survey of all important contributions in your area of research, with proper references.

If the section/chapter name was just “Related Work”, this is not normally a good section name since it is generic. A better section name will be a non-generic name, for example, “Overview of Formal Design and Analysis Methods”, clearly identifying related work area.

Each time you read a paper or a technical report or somebody else’s thesis related to your area of research, just write at least one paragraph summary of what you have understood and record it in this section. If you cannot write this paragraph, read the document again and re-try. Do not copy/paste the abstract and/or selected paragraphs/sentences of the document you read into your manuscript (kendi kendinizi aldatır, yazmayı hiç öğrenemezsiniz..!). You can copy/paste a figure, diagram or table that you find important, but you must clearly reference it. For example: (Ayla 2008a, Fig 4.5)

Write your references in format (Lastname 4-digit-year) format in your manuscript, even if target documents requires other formats of references. “Lastname” is the lastname of the first author of the publication and “4-digit-year” is the year of publication. If there are multiple publications of the same lastname in the same year, use letters a, b, c etc after “4-digit-year” to distinguish publications. For example: (Ayla 2008a), (Ayla 2008b), etc. You can convert (Lastname 4-digit-year) format to any other reference format easily.

References to web sites is not a good idea since web sites disappear. Some authors provide the date and time of web site references, but I think this is still not a good idea.

If you forget to include a very recent and an important research contribution, God forbid by the reviewer of your manuscript or even worse by a member of your thesis jury, you will really be in deeeep trouble.

2.1. Related Work: Overview of Formal Design Methods

Subsections are normally necessary since chapter 2 is usually a long one. Nobody likes a literature survey which is not structured.

2.2. Related Work: Overview of Software Design Tools

Complete specification of software tools (compilers, frameworks, simulators, etc) used during, for example, in your analysis.

3. My/Our Proposal: A new Approach for

Do not use a simple generic section/chapter name such as “The Proposal”, You must properly name this section/chapter by a non-generic name, that clearly reflects your real contribution.

What will be the name that you have selected for your contribution? It is a very good idea to give a name to your solution proposal, for example the name “CORT” below.. If reviewers/jury members find your contribution very significant, your name will be associated with this solution and you will be very famous since you have proposed the solution with this name first.

Examples:

- A New Approach for.....
- Proposal of a New Method for Formal Representation....
- CORT: A New Framework to Do Something

This section/chapter details the main contribution of your research work. There could actually be more than one chapter to detail the main contribution of your research work.

You must start identifying the problem clearly, once more, with sentences from the Introduction chapter. Then, detail the alternative solutions you consider, criteria to evaluate alternative solutions, justification to select your solution, what your solution really is, etc, in several subsections.

It is always a very good idea to place,

- at least one diagram/figure/photo giving the overall view of the problem you attempt to solve,
- if necessary, one or more similar diagrams/figures describing subproblems of your problem,
- at least one diagram/figure/photo giving the overall view of the solution you propose,
- if necessary, one or more similar diagrams/figures describing components of your proposed solution

at the beginning of this section/chapter. Remember “**Bir resim bin sözcüğe bedeldir.!**”

There could be several citations to research work by others, if these citations are directly related to your solutions. It is important for you to clearly identify, what others have done and what you have done to solve the problem. You must clearly specify what is different in your solution and what are advantages of your solution over other existing solutions, if there are any other solutions.

4. Case Studies: A new Approach for

One or more case studies to demonstrate how good a solution you provide. It is better idea to provide at least two case studies, a simple one and a more complicated one. Case studies should reflect real life problems and how you apply your method to solve them.

4.1. Case Study 1: Blah, Blah

Obviously, you will again properly name this section by a non-generic name, that identifies the case in a very clear manner. For example, Formal Representation of Bogazici Network Security.

4.2. Case Study 2: Blah, Blah, Blah, Blah, Blah, Blah, Blah

As in Case Study 1.

5. Conclusions and Future Work

Statements/paragraphs from your Introduction chapter, basically to identify the following once more, in a repetitive manner.

- **What was the problem area?**
- **What was the problem?**
- **How did you solve the problem?**
- **What were the advantages of your solution?**

You should also comment a little bit on the shortcomings of your solution. This must be done by using some political language. Obviously, do not write a sentence such as “We have proposed this solution CORT, but actually CORT framework is bullshit, it does not work.

What is missing in your solution?

Which aspects of your solution could be further improved by further research?

Refrain from writing detailed descriptions of future research areas for others, but you may just provide some hints. Do not forget that you will continue to carry out research, probably until you are dead for good. This is true unless you are fed up with this research area and/or your advisor.

References

All journal articles, conference/symposia/workshop papers, technical reports, etc that you cite in this manuscripts, preferably in IEEE journal format.

Each document you cite better identified by using (FirstAuthorLastname YYYY), rather than a number in the form (1), (2), (3), etc.

No citations to URL's of web sites, unless absolutely necessary. Do not forget that web sites disappear from Internet.