ARISTOTLE UNIVERSITY
OF THESSALONIKI

dream
Validation of radical engine architecture systems

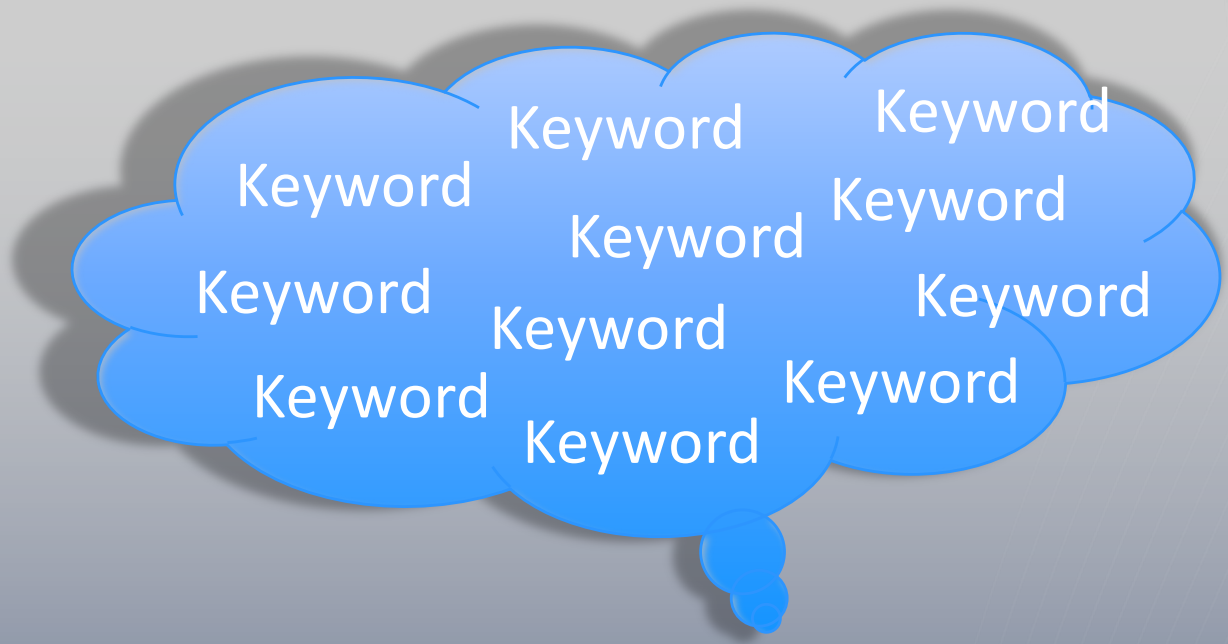
How to Paper

A Simple Guide on
How to Organise Writing a Research Publication

Anestis Kalfas

Credits to my Tutors for introducing me to effective writing
Thanks to Dr Emidio Giordano for initiating this document based on our academic discussions
Please, use this guide carefully and do not limit your inspiration, creativity and spontaneity

Title



…something for some kind of application… in 5 words

Write down all relevant keywords
Combine them in three – four titles
Whittle them down removing all unnecessary words
Keep only the essentials on the title. Make it meaningful
Start with an unusual – impressive word. Make it interesting

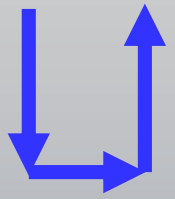
Abstract

- This is not literature
- Treat this as a mathematical equation with symbolic characters. Placement of words and sentences matter.
- Normally arranged in three paragraphs.
  - Size ratio 5-20-1 (1^{st}-2^{nd}-3^{rd})
- Make sure that you conclude with a “take home” message for the interested reader (meaningful, impressive, sparkling)

- Paragraph 1 – The title in many words
  - Explain the title in more words - 5 sentences
  - Write here what could not fit on the title
  - Absolutely NO introductory comments
- Paragraph 2 – Synopsis – The paper in a para
  - Intro (not essential),
  - What was wished to be done
    - Motivation, Goals
  - How it was Attempted
    - Approach, Methods
  - What was the outcome
    - Main results, observations, variations
  - What lessons were learned from all that
    - Some Conclusions
- Paragraph 3
  - The most spectacular outcome of this work

Conclusions

- Write Title first
- Write Abstract second
- Write Conclusions third



Re-write/realign Title Last
Re-write/realign Abstract before Title
Re-write/realign Conclusions before Abstract

Write the Paper

- The main goal, at this stage, is to create a lighthouse in order to make sure that the material provided in the FOLLOWING steps that follow is consistent with the "red thread of the paper and that the conclusions are supported by the findings of the PRESENT paper. The conclusions NEED TO BE UPDATED at the END
- Normally arranged in 3 paragraphs
- 1st - Statement of work, What has been done, May be obvious but necessary
- 2nd - Main observations, results obtained, outcome achieved
  - Result 1 Observations
  - Result 2 Generalisations – Attempt to generalize and give a global viewpoint
  - Result 3 Mathematical Modelling – Correlations.
- 3rd Fireworks! (what amazingly spectacular has been achieved)

Nomenclature

- Collect symbols and abbreviations here
  - In order to have a coherent symbolic system
- Make sure that the same symbols are used throughout the paper
- This has to be done close to the start of the write up. Not at the end. Of course, additions can be made at any time.
- Keep it simple and consistent
- Use, Latin Characters, Greek Characters, Sub- Super- Scripts, Abbreviations

Introduction

- General intro to the subject (very small but crucial starting point)
- Literature survey
  - Geographical spread (make sure that all of the existing literature is covered)
    - 40% EU, 40% USA, 20% Other
  - Some academia and some industry
  - 20+ references, grouped by theme, each theme a different paragraph
- Motivations in the last small paragraph
  - The idea here is that it is shown that
    - after studying the current state-of-the-art
    - a hole in the literature has been identified
    - an attempt is made to address this issue

Motivation

- Clearly identify the motivation of this work
- Write the small paragraph of the motivation in this space
- Make sure that every single word is carefully chosen
  - Motivation can start from very big and global issues
  - Should also address small designer needs
  - May also be a very small but crucial detail that if addressed properly my be a game changer
  - Never state that this was given to you as a task (by your seniors, by your professor, by the related industry, by your boss, by someone important…) NEVER
    - It may be taken to mean that you have no idea of what you are doing
    - Or that you are doing some name dropping to feel important

Approach - Methodology

In this section, the approach used to achieve the Goals set out earlier should be covered. As methods, you may consider whatever you may have used

- Experimental EXP, Numerical NUM, Theoretical THEOR, Modeling MOD

Present the method itself

- Show and Describe the EXP facility, Domain of NUM, THE formulation – basic principals, MOD approach – Zero order of magnitude analysis
- Show how it is applied in the configuration under investigation

- Detailed Analysis ACCURACY in measurements, computations or modelling
  - THIS IS OF UTMOST IMPORTANCE. WITHOUT IT YOUR CLAIMS ARE SELF-INVALIDATED
  - Accuracy of numerical scheme, order of solution scheme (accuracy in space – accuracy in time) accuracy of the solution procedure (residual history) - grid independency study
  - Error Propagation, Error evaluation procedure, Values of uncertainties (error bars)
  - Just referencing what software is used is not sufficient, not-self justified, need to do a careful analysis of the errors' sources and their propagation, their final values and confidence of values presented in the results section.

Data matrix

- In this section, the various cases considered should be shown
- How is the test cases chosen for the application and the results obtain

- Number of Cases
  - 2 cases Baseline – Advanced Design
    - a comparison can be made based on gradient (1st Order)
  - 3 cases Baseline – Improved – Advanced
    - a comparison can be made based on gradient (1st Order) and curvature (2nd Order)
  - 5 cases Baseline ± Parameter 1, ± Parameter 2
  - Many cases
    - Cloud-of-Points in a Multi-dimensional space (Many Parameters)
    - A finite number of combinations of parameter values are selected
    - Selection procedure - DoE (Design of Experiments) method

Results Figures 1-15 …

Can be an equation, a picture, a graph…

1. Explain what the item represents.
   - Take time to explain what may seem obvious to the author
2. Explain what the author's point of view sees in this figure.
3. Why does the author think that this has to be explained to others
4. What is there that is explained it becomes obvious to everyone
5. Why the author thinks this is useful to anyone
6. Answer the "So What?" question.
7. RED THRED check.
   Ask yourself the question
   "If this figure is taken out, would it take some significant bit of information away with it?".
   If the answer is NO; take it out, irrespective of whehter you like it or there are nice colours…
8. Last sentence should be the "PUNCH LINE"
   the "take home" the "resumé" the "message"
   the "elevator talk" of this Figure

- Position here the figure you are discussing
  - Graphic
  - Schematic
  - Equation
  - Picture
  - Table
  - Whatever
- **REPEAT** that for each and every Figure
  - The indicative number of Figures is 15
  - Any other number is also fine.
  - Exercise constraint on what is needed and what is not

Discussion – Novelty and Volume

- Make sure that you write clearly what are your claims
  - They should be Novel
  - There should be a sizable Volume of Work supporting these claims.
    The evidence provided may be exp, num, mod, etc or various combinations

- Explain the problem that was solved
  - what was the motivation,
  - what was the issue, the problem to solve
  - What was done and how – what is the novelty
  - What Results have been obtained (in volume – just what is relevant)
    - Group the results and use subtitles to describe them
- Discussion (1/2 page), bring all the results together, your personal view, one simple graph with trends

- Last short paragraph: what was the most spectacular outcome of this work, few words, just one number that summarize all the results

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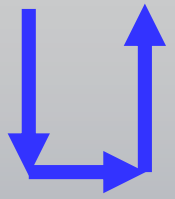

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  The conclusions NEED TO BE RE-WRITEN and FINALISED

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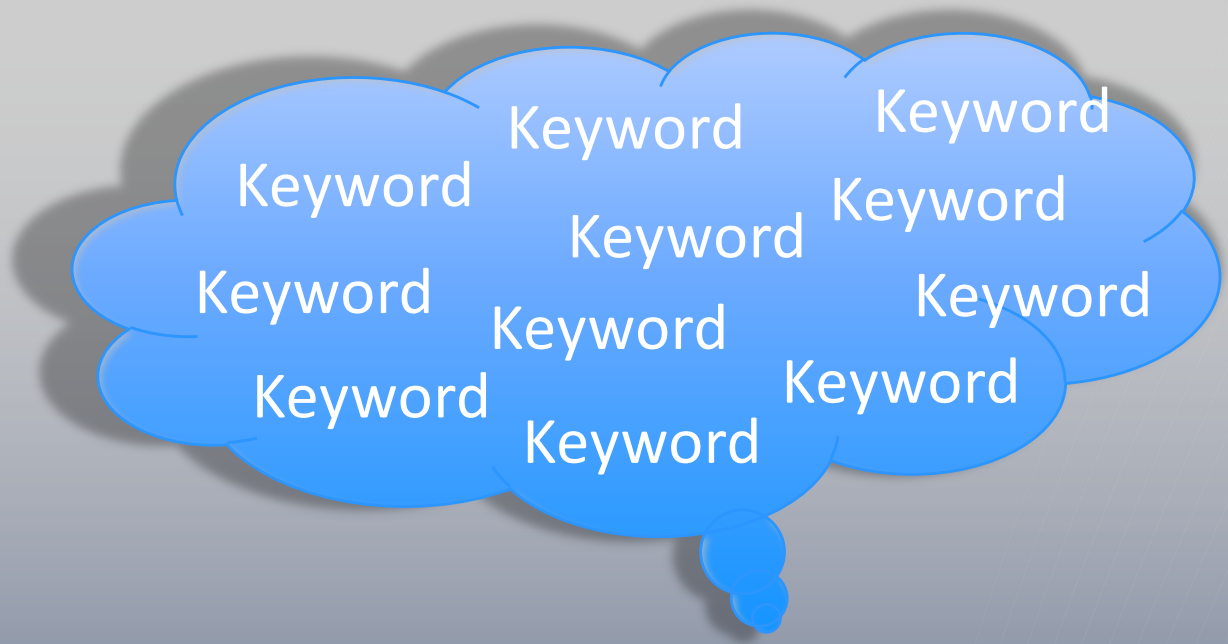

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