Why, where and what to publish?
Language and style
The paper or report structure
Other issues

Writing Technical Reports and Papers

A seminar

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Why, where and what to publish?
Language and style
The paper or report structure
Other issues

Outline

1. Why, where and what to publish?
   - Why where and what?

2. Language and style
   - Use of language
   - Style

3. The paper or report structure
   - The beginning
   - The middle
   - The ending

4. Other issues
   - Reproducible research
   - The review process

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Why where and what?

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Why where and what?

Why write it up?

- Internal reporting:
  - Communicates your ideas and results to your peers, managers or professors.
  - Builds profile within the organisation.
  - Contributes to the award of a degree.

- Externally - at conferences or workshops or in journals:
  - Communicates your ideas and results to your peers in other organisations, nationally and internationally.
  - Builds reputation (CV) for yourself and your organisation;
  - Attracts funding or exploitation opportunities.
  - Public engagement.
  - Provides personal satisfaction/motivation.

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Why where and what?

Where to publish?

- Wherever creates the most impact for your work.
- Conferences and workshops:
  - Target the top international conferences where possible, as these will attract the best and most influential people.
  - For example IEEE International Conference on ...
  - They will also provide the most esteem for you and your organisation.
- Journals:
  - Target the best and most suitable journals.
  - Typically IEEE Transactions in EEE/ECE.
  - Special issues can be very high impact.
  - Bibliometric indicators are available for all good journals.

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Why where and what?

What to publish?

- Quite simply – your best work.
    - Publishing weak or poorly presented work can lead to a diminished reputation.
    - Quality over quantity!
- Early stage results can be published in short letters or in conferences (constrained page counts).
- More complete work should normally be published in reputable journals (longer articles).

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Why where and what?

...How do you ensure that it is a great report or paper?

- Make sure you are clear about what the problem is.
- Make sure that the novelty and benefits are clear.
- Make sure your work is placed in context - show awareness of the SoA.
- Reflect the **Scientific Method** in your writing:
  - Formulate the question.
  - Form the hypothesis
  - Prediction.
  - Test the hypothesis.
  - Analyse results
- **Data**: Make sure you have sufficient and diverse data for training, testing and evaluating your methods.

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Why where and what?

...How do you ensure that it is a great report or paper? (2)

- **Benchmark**: Make sure that comparisons of performance are benchmarked against the state of the art: place your work in context.

- Make sure that **appropriate metrics** are used for evaluation.

- Make your results **reproducible** by others – open access.

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Use of language
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Use of language

- Many texts on scientific writing advise the use of an impersonal rather than a personal style of writing.
- An impersonal style uses the passive voice, the third person rather than the first person or second person (it rather than I or we, or you), and things rather than people as subjects of sentences.
- However, the passive voice can produce writing that is less natural than the active voice.
- In some disciplines it is now accepted to use the active voice and personal pronouns such as we.
- But **remember** - its not about you, its about the contribution and the reader!
- Simple recipe: **Introduce, Expand, Conclude**.

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Writing style

- Be **consistent and unambiguous** in your structure, your diagrams and your mathematical notation.
- Be authoritative and yet enquiring in tone.
- **Use illustrations** to: illustrate, clarify and emphasise.
- **Plan your structure** (sections/subsections), use clear headings and numbering to help the reader navigate the paper.
- Use the style template specified by the publishing organisation.
  - Usually MS Word and Latex templates are available - Latex normally looks more professional.
- Study the style of well known or highly cited papers.
- Always **spell and grammar check** and have an independent person read through – a fresh pair of eyes.
- Beware **plagiarism**!

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The abstract or executive summary

- Very important – usually the first thing read by a reviewer or assessor.

- Provides the reader with a very concise and complete overview of what the paper is about.

- Sometimes word limited so you must be concise and informative.

- Include the following:
  1. What is the problem addressed by your work?
  2. What are the key components of your approach - how does it differ from the prior art?
  3. What are the main results/contributions, and how do they improve on previous work?

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The introduction

- Also very important – usually the second thing read.

- **CLARITY**: **Remember that the readers may not be as specialised as you**.

- Include the following:

  1. **What is the problem** addressed by your work?
  2. **Why is it interesting** and important - and what are the potential benefits if the problem is solved?
  3. **Why is it hard** and why hasn't it been solved before - what is wrong with previous proposed solutions?
  4. **What are the key components** of your approach - how does it differ from the prior art, how is it novel?
  5. What are the **main results/contributions**, and how do they improve on previous work?
  6. Overview of the structure of the remainder of the paper.

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The state of the art review

- Places your work in context and shows what work competes with or underpins your own work.
- Include the following:
  1. Show **awareness** of work of others - identify its limitations
  2. Reference your own, national and international work.
  3. Be **critical** and identify issues.
  4. Impact of and on standards.
  5. Restate the outstanding problems and lead into your proposed method.

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The approach or experiment

- Describes what you have done.
- Include the following:
  1. Theoretical underpinnings.
  2. Experimental procedures.
  3. Equipment used.
  4. Test **data sets** used and their source/parameters.
  5. How results have been analysed – statistics, performance metrics etc.
- Ensure all acronyms and variables are defined at the first point of use.

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Results

- Presentation of the data collected and the results obtained in the most appropriate form for the reader to digest and interpret.

- Assesses what you have done.

- Include the following:

  1. Clear and unambiguous presentation of results- use graphs rather than tables where appropriate to allow the reader to visualise your results.

  2. Consider what needs to be presented:
     - Prioritise performance parameters - quality, delay, complexity, throughput, size, weight, power...

  3. Include comparative results - **Benchmarking** against state of the art.

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Discussion of results

- Puts your results in context and explores their more subtle aspects that may not be immediately obvious.
- Helps the reader to understand your results and their implications.
- Include the following:
  1. Discussion of comparative analysis - **strengths and weaknesses** compared to state of the art and other competing methods.
  2. Bring out other issues - e.g. complexity etc. as discussed on the previous slide.
  3. Discuss the broader implications of the results.

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Conclusions

- Important – often the second or third thing read by a reviewer.

- Summarises what you have done and its implications.

- Include the following:
    1. A summary of the approach.
    2. Key findings and the improvements obtained.
    3. Implications of the results - strengths and limitations.

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Suggestions for future work

- A brief summary of what still needs to (or could) be done to improve things further.

- What opportunities are created by your work for further investigation?

- Be brief but specific and keep the suggestions relevant to the work presented in the paper.

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References

- References allow the reader to understand the background to and the context of your work without you having to reproduce all the details:
  - Allows you to focus on your own contributions.
- References help you and the reader to differentiate between your work and the work of others:
  - Helps to avoid plagiarism.

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Referencing styles

- Use a referencing style appropriate to the journal or conference. E.g. IEEE Transactions style:
  - [23] J.-R. Ohm, G. J. Sullivan, H. Schwarz, T. K. Tan, and T. Wiegand, "Comparison of the coding efficiency of video coding standards—Including High Efficiency Video Coding (HEVC)," IEEE Trans. Circuits Syst. Video Technol., vol. 22, no. 12, pp. 1668–1683, Dec. 2012.

- E.g. Academic Press style:
  - [15] F. Zhang, D. Bull, A parametric framework for video compression using region-based texture models, in: IEEE Journal of Selected Topics in Signal Processing 6 (7) (2011) 1378–1392.

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Appendices and acknowledgements

- Always acknowledge your collaborators or sponsors.
- Use appendices for content that is not essential to the flow or understanding of the main body of text.
  - E.g.: Proofs Detailed algorithm descriptions. Dataset descriptions etc.

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The review process

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Ensuring reproducible research

- All research results should be independently reproducible if the code or design and data is available.
- For each activity, make available (e.g. on website):
  - Full reference of your paper(s) or report, with current publication status, and a PDF copy. This allows others to cite it correctly.
  - Code or design to reproduce all the results, images and tables. Make sure the code is well documented, with a readme file explaining how to execute it.
  - The data (files, images, measurements, etc) to reproduce all the results in graphs, images and tables. Add a readme file explaining what the data represent.
  - A list of configurations on which you tested your code (software or hardware type, version, platform).

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What reviewers / assesors are looking for.

- Is it addressing an important and significant problem?
- Other related work –is the work placed in context?
- Novelty / originality of approach?
- Significance and reach of the findings?
- Is the methodology clear, logical and correct?
- Is the test data appropriate and sufficient?
- Are the results well presented, benchmarked and significant?
- Are the implications clearly discussed?
- Is it clearly presented, accessible and reproducible?

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Concluding remarks

- Publication, internally and externally is important for disseminating knowledge, developing collaborations and building reputations.
  - It can bring major benefits to individuals and institutions.
- Successful publications address important problems, they have clear objectives, are clearly presented, logical, rigorous and well benchmarked.
- "Tell the reader what you are going to say, say it, then tell them what you have said."
- Always target the most appropriate and the highest impact journals and conferences.
  - Make your work accessible to the widest audience.
- Most good papers will have more than one author – **collaborate**.

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Good Luck!

Some References

- http://www.ce.rit.edu/people/melton/250/writing/TechnicalWritingCharacteristics.pdf
- http://learntechwriting.wordpress.com/2013/02/03/back-to-basics-the-10-golden-rules-of-technical-writing/ http://web.mit.edu/me-ugoffice/communication/technical-writing.pdf
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