Ioan Lager

Scientific Output: drawing a publication and preparing a presentation

Lecture handouts

September 17, 2006, Sinaia, Romania

http://scee06.org

COMSON course

Scientific output: drawing a publication

Ioan Lager

Sinaia / Scientific Computing in Electrical Engineering – SCEE 2006

17 September 2006

IRCTR, Faculty of Electrical Engineering, Mathematics and Computer Science

TU Delft
Delft University of Technology

To start with…

- Writing a paper is a trade ➡ you learn it by means of apprenticeship
- How you start is essential: good and bad habits will accompany you throughout your career

Focus points

- Before we start writing
- Overall organisation of a paper
- A valuable work ⇨ a publishable contribution:
  what to do **&** what to avoid

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When to start writing a paper

When the research is sufficiently matured, but not later

- You must have something meaningful to say

BUT

- There will be always something "extra" to add, you will never be able to write "everything"
- Topics are "cooking-up" more or less simultaneously in the minds of more people; wanting to be exhaustive ➡ someone else will publish it before you

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Take a moment to thoroughly think at

- What do you want to communicate:
  - do you have a message?
  - what do you want to stress?
- To whom do you have to communicate:
  - what are the main features of the publication to which the contribution is submitted: mainly theoretical, mainly applicative, mainly technological, mainly commercial?
  - what is the impact of the publication: large, limited, highly specialised?
  - are you new in that community?

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Now that you know

- Prepare a sketch of your work (see later the component parts of a paper)
  - it needs not being succinct
  - preferably, write it by hand; at this moment, the word-processor may divert your focus from what to how; it is too early for that
- Discuss your scheme with someone else; you will be surprised how much clearer you see the contents after trying to convey your idea to a colleague

Finally, in front of the computer

- You have to write a scientific work ➡ you have to use the adequate utensils

  ⬇

  My strong recommendation: use LaTeX for typesetting
- Is there a pre-defined template provided by the editor? Is it available in your work environment? Do you have to make adjustments?

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The parts of a paper

- Title
- Abstract
- Introduction
- Body of the paper
- Conclusion(s)
- References
- Possibly, appendices

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The title

- It should express directly and concisely the main goal of the paper
- Some suggestions:
  - usually, not articulated
  - avoid formulations as: "An approach…", "A method…"
  - avoid at, all costs, formulations as: "An original…", "A novel…" and the kind; all reported contributions are supposed to be "novel" and, at least, "original"
  - watch out for semantic and grammar mistakes; here, they are the most visible

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The abstract

- **SHORT!!!** (max. 200-250 words)
- To the point:
  - state clearly what is the problem
  - the main features of your approach
  - what do you aim at
- Don't give references
- Don't refer to other's work

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The introduction

- This is the place to analyse the state-of-the art in the field
- Identify a problem to be solved
- Investigate previous approaches (if any) – give relevant references
- If you had previous contributions to the field, mention them; do this parsimoniously (it has nothing to do with modesty but with demonstrating your familiarity with the investigated topic)

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The introduction

- Identify the limitations of previous approaches (the famous "But" paragraph) ➡ this justifies the quest for something new
- Present your philosophy for tackling the problem
- Sketch the programme of your account (the main parts and the flow of ideas)

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The body of the text – composition

- Define your prerequisites:
  - configuration
  - notation
  - possibly, conventions applying throughout the account (e.g. acronyms!)
- Remember: no one is obliged to know what you know

  ⇓

  explain everything or give references whenever new concepts are introduced!

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The body of the text – composition

- Start presenting your ideas
- Usually, theory precedes practical/ numerical implementations
- An (appropriate) picture tells much more than words; however, pictures with no comments are, practically, useless
- Recall to explain new concepts/ entities whenever necessary

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The body of the text – composition

- Don't skip over intermediate results
- Don't be scarce with explanations; if a result or formula needs being demonstrated, do this as detailed as possible
- Elaborate demonstrations appear, usually, in appendices; if you do not provide them in full, give, at least, some hints in the body of the text

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The body of the text – composition

- An enumeration of concepts/ ideas is often difficult to follow ➡ split it into separate sentences
  Personal opinion: render it as an itemised list
- Employ a logical splitting of your account in sections and subsections ➡ it enhances the clarity of your presentation

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The body of the text – mathematics

- Avoid excessively complex formulas, especially ones with many subscripts/ superscripts (this is not the case with books and reports!)
- Rendering of ratios:
  - personal opinion: fractions are clearer, at least in equations
  - many editors/ publications prefer slashes (/); this may also be more convenient in inline mathematics

The body of the text – figures/ plots

- Make your plots self-explanatory; include, whenever possible, a reference to the investigated configuration
- Avoid confusing plots (e.g. plots of the results concerning the same configuration viewed from different viewpoints)

The body of the text – figures/ plots

- Don't overcrowd your plots!
- Coloured plots render poorly in black & white
- Different markers tend to overlap, rendering your plots indecipherable; using different types of lines may be a better idea
- Avoid bitmapped graphics; above all, compressed bitmapped graphics

And the list never ends…

The conclusions

- Reiterate the goal of your contribution, as announced in the abstract, by pointing out how your (original) approach has solved the proposed problem

  very much, the tcartsba

- Do not draw conclusions on topics that were not discussed in the body of the text ➡ an aspect cannot be mentioned for the first time in the conclusions

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The references

- Don't overcrowd your list of references (aiming at a "scholarly" aura); a few reference publications will certainly do the job

- Don't disregard old articles and, above all, old books; you may be surprised how much of the "new" and "original" issues are long since addressed...

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The references

- The references must be included in the list in the order in which they are cited in the text
- Use the IEEE style for rendering bibliography items
- Some publications require acronyms for journal names, some full names; the latter choice is more convenient for the reader

  Note: the current IEEE style makes the use of acronyms mandatory – the list of expected acronyms is enclosed with the guidelines

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The references

- Prepare your list of references carefully
- There is nothing more annoying then a sloppily compiled bibliography, culminating with references to inexistent articles (or, less often, books)

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The appendices

- This is no second-rate part of a paper

  They are often read more attentively then the body of the text ⟺ are expected to provide valuable insight

- The appendices are the polite handle that the authors offer to the reader for understanding more difficult mathematics occurring in their account

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Focus points

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- Overall organisation of a paper
- A valuable work ⇒ a publishable contribution:
  what to do **&** what to avoid

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That 💣☠♓♒☹☠ language…

- Accounts concerning meritorious research are rightfully rejected by the reviewers because of (extremely) bad phrasing
- Remember:
  - you have to pass information
  - language is the primary vehicle
  - if this does not work, all the rest is futile

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Is there a golden rule?

- Sadly, there is not
- Personal opinions:
  - write a (large) number of papers together with someone who has a good command of English (preferably, a native speaker) ➡ learning the trade = apprenticeship
  - if this is not possible, write your contribution and ask someone to proofread it
  - read a lot of English (technical) literature ➡ enlargement of your vocabulary
  - write down (regularly) words and expressions read in books or heard on various occasions ➡ keep them close at hand

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What to avoid?

- Don't rely blindly on spelling checkers
- Don't take literally syntax recommendation from word-processors
- Give precedence to a good dictionary (Oxford or Webster) over a thesaurus
- Watch out for words taken over from English into your own language (the more so for words that sound alike, only); you are walking on really thin ice

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Widely established practices

- Don't use long sentences: English is not suited for this

NONSENSE

- You can write very long, perfectly meaningful sentences in English (it can be even done in an extremely stylish manner); it is not inappropriate, it is only difficult

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Widely established practices

- Personal ("we") vs. impersonal address ➡ both are equally valid
- The former:
  - \+ it is the common practice
  - \+ it is easy to handle
  - – at times, it can become slightly dull (due to excessive repetitions)
- The latter:
  - \+ it is more elegant
  - \+ it gives more freedom of expression
  - ± it is sometime more difficult to manipulate

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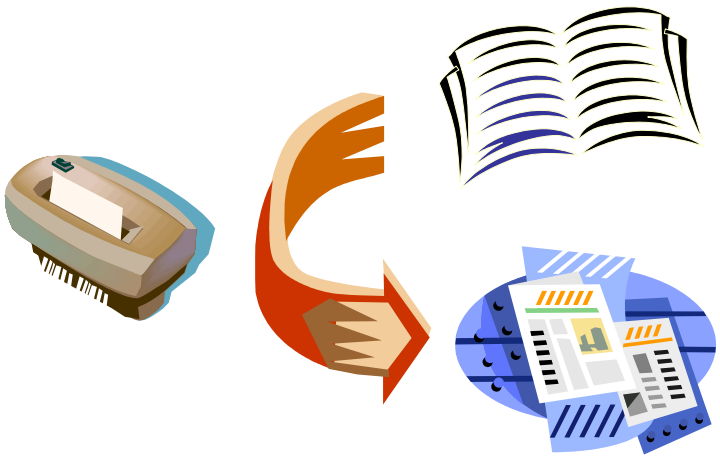
A painful, painstaking job



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Options for meeting allotted space

- Rephrase the text ➡ it will provide you with most of the space savings
- Re-scrutiny the list of references and eliminate superfluous ones
- Play a bit with the sizes of the pictures and tables but avoid diminutive plots
- Are all equations necessary? Can you rearrange them?

...use your imagination...

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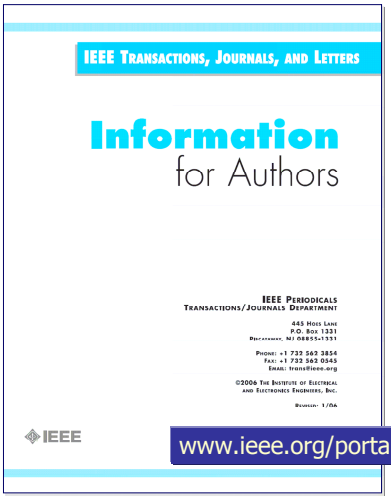
Main guides to writing IEEE papers



Information on:

- Organising the material
- Typesetting conventions
- How to…
- IEEE publications acronyms

www.ieee.org/portal/cms_docs/pubs/transactions/auinfo03.pdf

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Main guides to writing IEEE papers

How to Use the IEEEtran LaTeX Class

Michael Shell, *Member, IEEE*

(Invited Paper)

Template for drawing an IEEE publication in LaTeX

www.ieee.org/portal/cms_docs/pubs/transactions/auinfo03.pdf

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Main guides to writing IEEE papers

Preparation of Papers for IEEE TRANSACTIONS and JOURNALS (June 2003)

First A. Author, Second B. Author, Jr., and Third C. Author, *Member, IEEE*

Template for drawing an IEEE publication in MS Word

www.ieee.org/portal/cms_docs/pubs/transactions/auinfo03.pdf

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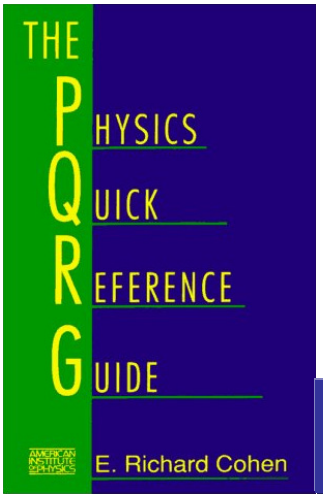
Other relevant guides for scientific style



Information on:

- Standard nomenclature in physics/ chemistry
- Typesetting/ notational conventions
- Miscellaneous formulas
- Mathematical functions
- …

R. E. Cohen, *The Physics Quick Reference Guide*, American Institute of Physics Press, 1998.

ISBN: 1563961431

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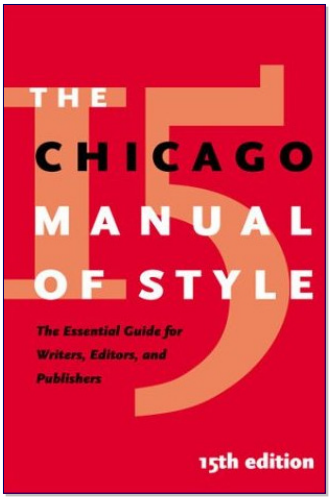
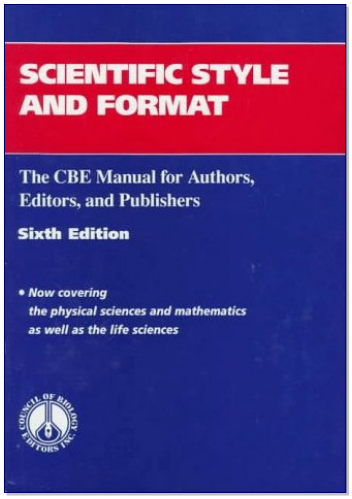
Other relevant guides for scientific style





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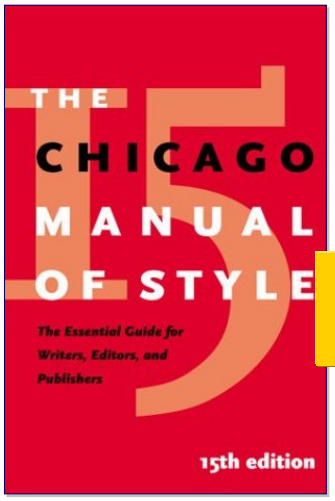
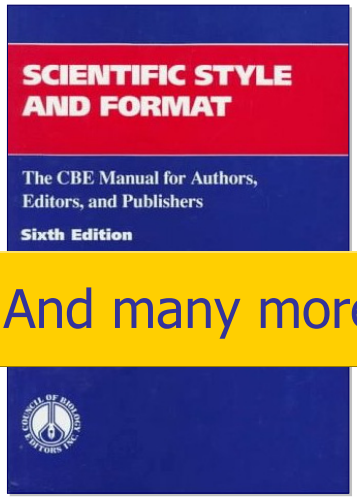
Other relevant guides for scientific style





And many more...

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Acknowledgements

- Dr.ir. Gerrit Mur, Delft University of Technology, Laboratory of Electromagnetic Research – my first mentor and my constant companion in drawing many, many scientific publications

- Professor dr. Adrianus T. de Hoop, Delft University of Technology, Laboratory of Electromagnetic Research – the one from which I indisputably learned most about drawing high level publications – his works will always represent an almost impossible to equal model

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COMSON course

Scientific output: an oral presentation

Ioan Lager

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To start with…

- A talk is a show ➡ the gap between a success and a flop is amazingly narrow
- The speaker wants something from the auditor and not the other way around ➡ the auditor is the master

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Focus points

- Before we start the actual preparation
- Preparing the slides
- Delivering the speech

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Your paper has been accepted and it is already finalised ➡ you have a story, isn't it?

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Your paper has been accepted and it is already finalised ➡ you have a story, isn't it?

WRONG!

Your talk is no reiteration of your paper

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Take a moment to thoroughly think at

- What do you want to communicate? (make a selection)
- What do you want to stress?
- To whom do you have to communicate:
  - what are the main features of the audience: mainly theoretical, mainly applicative, mainly technological, mainly commercial?
  - are you new in that community?

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Some technical choices

- Most probably you will have to use PowerPoint; maybe not optimal but, nonetheless, the standard…
- Light or dark background? ⇔ Handouts needed?
  - NO (e.g. at a conference) – any choice is possible
  - YES (e.g. for a meeting or a course) – you will probably have to use a white background ⇨ this may have repercussions on the layout

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Focus points

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The slides – (mis)conceptions

- You can always say (much) more than you can put on a slide
- You should see the slides as:
  - some handles for the audience in getting the principal ideas
  - supports for your memory
- Timing: **1** slide **=** minimum **20**…**25** seconds (it usually takes appreciably longer)

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The slides – (mis)conceptions

A proper preparation of the slides is instrumental for the success of your talk

BUT

If you are done with them, you are only (about) halfway to being done with the preparation of your presentation!

Overall structure of the slideshow

- Very much like a paper:
  - outline/ contents (**1** slide, possibly repeated between sections)
  - introduction (**1** or **2** slides)
  - body of the presentation (as much as needed)
  - conclusions/ summary (**1** slide)
- A good practice: include before the outline **1** or **2** slides with a "big idea" (something catchy that motivates the discussion of the topic)

Formulation

The message in a slide must be very easy to comprehend

- Use concise formulations (sort of slogans)
- Use positive formulations
- Try to be (as much as possible) affirmative:
  - not "i think", "in my opinion", "maybe"
  - but "it is" or "it is not"

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Rendering – text

- Use large fonts (typically, 24pt or 28pt as a basis)
- Use sans serif fonts (Tahoma, Arial, Helvetica) – this usually does not apply for mathematics!
- Be consistent: always use the same font (variant) for the same purpose
- Highlighting ➡ use colours, not special fonts
- Punctuation (. , ;) is usually omitted

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Rendering – mathematics

- Use formulas in moderation; the audience doesn't have the time to grasp a long and intricate formula
- Avoid poorly legible sub-/ superscripts
- Explain all symbols when used firstly
- Make sure your formulas are 100% correct; it can get really embarrassing!
- Ensure the consistency of the employed fonts

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Rendering – mathematics

$V(\boldsymbol{r}) = \int_{\Sigma} [(x_1^2 \boldsymbol{i}_1 + x_2^2 \boldsymbol{i}_3) \bullet \boldsymbol{\xi}(\boldsymbol{r})] \, \mathrm{d}S$ "Plain" text

$V(\boldsymbol{r}) = \int_{\Sigma} \left[\left(x_1^2 \boldsymbol{i}_1 + x_2^2 \boldsymbol{i}_2 \right) \cdot \boldsymbol{\xi}(\boldsymbol{r}) \right] \mathrm{d}S$ Equation editor

$V(\boldsymbol{r}) = \int_{\Sigma} \left[\left(x_1^2 \boldsymbol{i}_1 + x_2^2 \boldsymbol{i}_2 \right) \cdot \boldsymbol{\xi}(\boldsymbol{r}) \right] \mathrm{d}S$ LaTeX via TexPoint

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Rendering – mathematics

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Rendering – mathematics

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$$V(\boldsymbol{r}) = \int_{\Sigma} \left[\left(x_1^2 \boldsymbol{i}_1 + x_2^2 \boldsymbol{i}_2 \right) \cdot \boldsymbol{\xi}(\boldsymbol{r}) \right] \mathrm{d}S$$ LaTeX via TexPoint

Personal preference

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Rendering – figures

- Take care at the quality of the pictures (resolution, colours, fonts, etc.)
- Avoid confusing plots (recall the previous lecture)
- Make your plots self-explanatory (this is even more critical than in papers)
- Don't comment plots; you still have to speak about them

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Rendering – extras

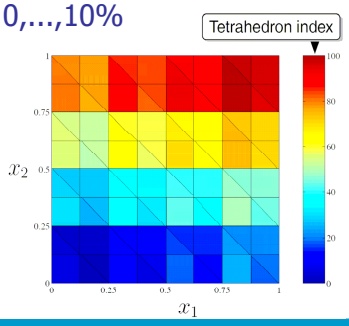
- Movies ➡ a process developing in time can tell a lot about an overall behaviour

  Example: expand the vector field $\boldsymbol{V}(\boldsymbol{r}) = x_1^2 \boldsymbol{i}_1 + x_2^2 \boldsymbol{i}_3$ over a uniform 3D triangulation; then apply an increasing, random perturbation within the range 0,...,10%

  Error analysis:

  Cartesian expansion

  Whitney edge expansion



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Rendering – extras

- Arrows ➡ better suited for indicating dependencies
- Other pictures for breaking-up ➡ useful, as long as they are simple
- Bullets ➡ simple, self-explanatory (•, –, +, –, ±); fancy bullets (☺, ☞, ☑) may become distracting

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Rendering – extras

- Arrows ➡ better suited for indicating dependencies
- Other pictures for breaking-up ➡ useful, as long as they are simple
- Bullets ➡ simple, self-explanatory (•, –, +, –, ±); fancy bullets (☺, ☞, ☑) may become distracting
- ~~Animation~~
- ~~Applets~~ (personal opinion)
- ~~Fancy effects~~

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Rendering – colours

- Be consistent! ⟺ observe few, easy to grasp rules for the use of colours (e.g. one for highlighting, one for comments, etc.)
- Choose a colour scheme from beforehand and adhere strictly to it
- Don't turn your slides into Christmas trees!

Rendering – colours

- A spot of bright colour catches the attention:
  - at the right place ➡ it highlights
  - at the wrong one ➡ it distracts
- Many spots of colours ➡ sure headache
- Use of colours = understanding aesthetics; if in doubt, consult someone else

Technical details

- Embed all fonts!
- Check your slides in an environment other than that of your computer
- Keep in mind that the resolution of the beamers is often poor; presently, the most common resolution is 1024×768 pixels
- PowerPoint is platform dependent ➡ the use of extremely fancy features is at your own risk

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Slideshow alternatives

- PowerPoint may be the standard…
  but there are other solutions, as well
- A viable alternative: LaTeX presentations ➡
  pdf + Adobe Acrobat
  (see http://www.tug.org.in/tutorial/pstricks/chap2-scr.pdf)
- If such an alternative is aimed at ➡ consult the representatives of the talk's venue

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Focus points

- Before we start the actual preparation
- Preparing the slides
- Delivering the speech

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At "home"

- Rehears the talk for yourself ➡ if the rehearsal takes 75-80% of the allotted time, you will quite likely run out of time during the presentation
- Rehears your talk for the members of your group
  - you can fix (small) flaws
  - you gain confidence in yourself

  Your colleagues are your friends; at the conference it is almost always very different…

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Before the event starts

- Contact the session's chairman/ meeting organiser

  inform yourself about possible last-minute changes
- Test the beamer (overhead-projector)
- Quickly browse once again through your slides; it is your last chance to fix possible incompatibilities
- Test the laser pointer
- Stay calm, relax!

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The speech – flowchart

- Greet the audience & the chairman!
- Deliver your talk
- Once in a while, gouge your time; if it is getting late, think already in advance at things that can be skipped!
- Thank the audience for its attention
- Leave time for discussions

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The speech – how to…

- Always face the audience (or, at least, give the impression of facing it)
- Assess your audience; let the audience take part in your show
- Try to make eye contact with people in the audience
- Stimulate the audience's curiosity and tension
- Give them time to process the information

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The speech – how to…

- A talk needs not be an exercise in eloquence ⇨ if you want to play safe, keep things simple
- Use of words:
  - some level of sophistication is usually expected – care is needed ⇔ adapt to the environment
  - witty comments add some colour (refrain from making them when you are new in a community)
  - pay attention to the previous speakers; they can tell you a lot about the group's culture
- Utter words clearly; if in doubt about pronunciation, consult someone beforehand

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The speech – how to...

- If you feel safer, keep some summary notes at hand
  However, it is better to do away without them!

- Some drama? – why not!
  - use gestures
  - move freely
  - add some dynamics
  - point on the board

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The speech – how to...

Dress-up adequately!

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The speech – how NOT to...

- Don't sit between the projector and the board!

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The speech – how NOT to...

- Avoid using an immature language (colloquial ≠ rudimentary)
- Excessive familiarity with the audience displeases
- Avoid recurring expressions (so, thus, etc.)
- Do not babble
- Do not make (useless) pauses

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Finally…

It is a show!

If you succeed, your effort will be largely appreciated;

if you fail, there is always another conference or similar event…

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Acknowledgements/ credits

- Dr.ir. Gerrit Mur and Professor dr. Adrianus T. de Hoop – for making me understand that a talk is, primarily, a show
- Professor dr. Alain Bossavit, Laboratoire de Génie Electrique de Paris – for demonstrating so many times the didactical value of a well prepared and delivered talk
- Dipl.-Inform. Bernd Mrohs, Fraunhofer Institute for Open Communication Systems, Berlin – for the excellent tips included in his course "Presentation Guidelines"

  (downloadable from http://www.mrohs.com/publications/Bernd Mrohs - Presentation Guidelines and Writing a Scientific Paper.pdf)

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COMSON course

Scientific output: a poster presentation

Ioan Lager

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To start with…

A poster is by no means a second-rate presentation technique

- A well organised poster session is much more fun than an (often dull) podium session
- Discussing a poster fosters a direct contact with an interested listener

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Focus points

- Basic facts
- Before we start the actual preparation
- Preparing the poster
- During the poster session

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Focus points

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The poster (session) – basic facts

The poster is not a copy of your paper, not even an abridged version of it!

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The poster (session) – basic facts

- An oral presentation must be mainly heard, a poster must be mainly seen!
- Not only that it has to be seen, it has to be seen from a distance (1-2 m)
- If you caught the attention of the audience, your job is for 75% done

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Focus points

- Basic facts
- Before we start the actual preparation
- Preparing the poster
- During the poster session

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The first steps are "technical"

1. Learn exactly what the allotted space is; be attentive to placement details
2. Go in front of a sufficiently large, empty wall
3. Outline the allotted space
4. Obscure at least 50,…,60 cm at its lower part (practically always invisible and, anyhow, useless)
5. See how many standard (A0 or A1) formats you can now accommodate

This is your available space

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Now its time for some thinking

- You have very little room! ➡ What do you really want to communicate?
- To whom do you have to communicate:
  - what are the main features of the audience: mainly theoretical, mainly applicative, mainly technological, mainly commercial?
  - are you new in that community?

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Some technical choices

- Basically, there are no recommendations concerning the software to be used for generation
- Irrespective of what you use, the final product is a (pdf formatted) image that will be enlarged **×2** or even **×4**
- Check beforehand with the poster manufacturer if restrictions concerning the delivered pdf file apply

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Focus points

- Basic facts
- Before we start the actual preparation
- Preparing the poster
- During the poster session

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Overall structure of the poster

- It is less rigid than in a paper
- State very clearly the problem – this stands for the "introduction"
- Arrange in a logical manner some text and some pictures – this stands for the "body" of the poster
- Use a slogan instead of "conclusions"; however, a picture illustrating excellent results is often sufficient (preferable, also)

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Formulation

- Use very short sentences
- No enumeration, only itemised lists!
- Guide the reader in an intuitive manner through your poster; best choice ➡ arrows

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Rendering – text

- Use very large fonts (at least 32 pt as a basis)
- Use (preferably) sans serif fonts (Tahoma, Arial, Helvetica)
- Be consistent: always use the same font (variant) for the same purpose
- Highlighting ➡ use colours, not special fonts
- Punctuation (. , ;) is omitted

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Rendering – mathematics

- Avoid, as much as possible, using formulas
- Prepare, instead, handouts with a detailed description of your work
- Try to illustrate math by means of pictures

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Rendering – figures

- They must be really self-explanatory
- Use colours rather than text
- Avoid colour dissonances; they distract rather than catch the attention
- Ensure consistency
- Take special precautions concerning the resolution of the pictures ➡ they may be enlarged **×2** or even **×4**

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The final product

- Have your poster printed by a professional publisher – it really pays back
- If possible, plastic cover your poster
- After the event, store your poster – you may needed it as an example

  Better still: hang it in your institution ➡ this is very good advertisement!

Compulsory extras

- Always have some copies of your full paper at hand (mind the copyrights!)
- If you make use of intricate mathematics, prepare handouts (details may have not been accommodated in the paper, either!)
- Ready-made devices/ samples

Other extras: the handouts

- Additional computational results or pictures that demonstrate the strength of your solution
- Think of some complementary movie (a PowerPoint presentation?) running in the background
- Advertisement gadgets
- …

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Focus points

- Basic facts
- Before we start the actual preparation
- Preparing the poster
- During the poster session

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Before the event starts

- Contact the session's chairman/ meeting organiser

  ⇓

  inform yourself about possible last-minute changes

- Post your poster at least half an hour before the session starts

- Prepare the supporting material (handouts, samples, gimmicks, etc.)

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During the session

- Recall: if you caught the attention of the audience, your job is for 75% done

- In a nutshell: in a podium session, you may be a scientist ⇔ in a poster session, you are a salesman

  ⇓

  It is you who has to approach the listener ⇒ be "aggressive" but polite

- Do not be scarce with explanations; the poster is the bait, it is for you to provide the information

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You'll see: you will really enjoy it!

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