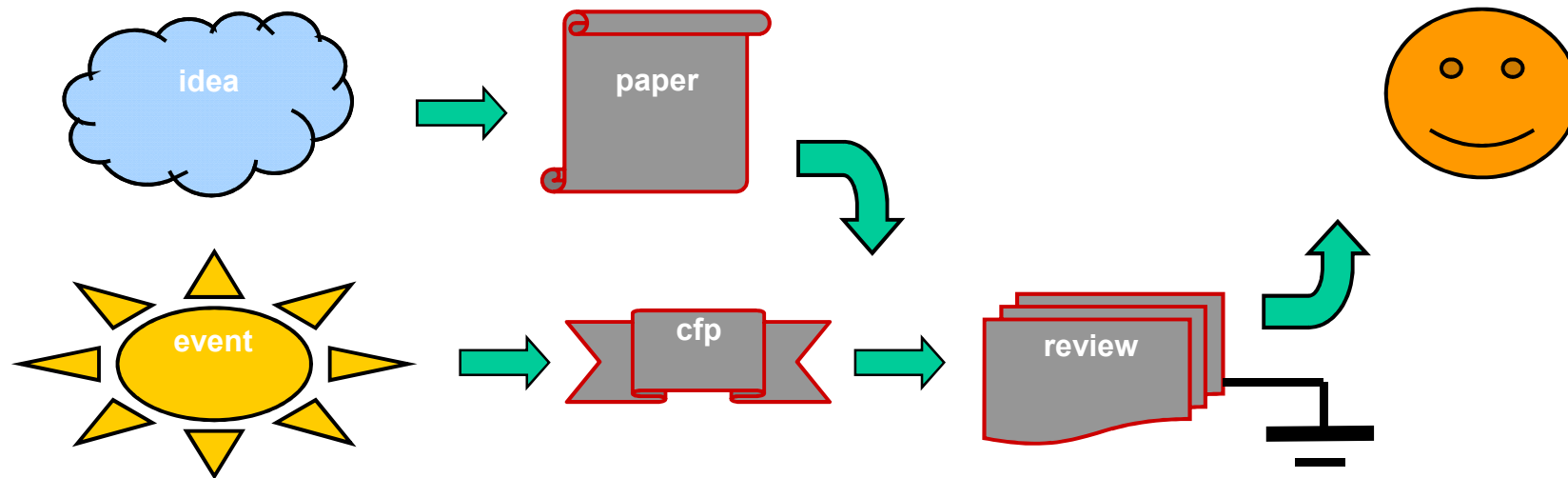


Appendix A: Scientific Writing

Writing a Thesis or a Technical Report

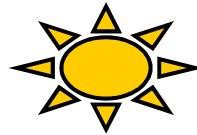


The process of a refereed scientific publication

A. Scientific Writing

Overview

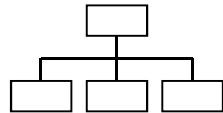
A.1 The Purpose of Writing



A.2 Developing Ideas



A.3 Structure



A.4 Writing



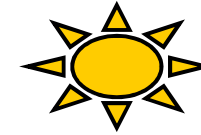
A.5 Reviewing Your Work



A.6 Summary



A.1 The Purpose of Writing



Scientific Writing has Many Goals:

- obtaining a degree (Bachelor, Master, Ph.D.)
- project documentation
- job requirements: "publish or perish" (your salary depends on)
- academic career (your reputation in a scientific community)
- just for fun (want to attend this conference on Hawaii)

Know Your Audience:

- Whom are you writing for?
- How and what to write?
- Know the process!

A.1 The Purpose of Writing

Process for a Thesis

- exposee (title, name, short intro, problem/topic, approach/tools, expected results, references, time table, all in 3pp.)
- application / registration (find two supervisors)
- bi-weekly meeting with supervisor(s)
 - research
 - development
 - evaluation
 - writing
- file your thesis on time (2-3 copies on paper + CD + statement)
- colloquium (presentation)
- grading (how much does your grade count?)

A.1 The Purpose of Writing

Process for a Scientific Publication

- submission according to call for papers (CFP)
- evaluation by 2-5 reviewers
- recommendation (referee / program committee)
- decision notification (conference chair / journal editor)
 - accept
 - reject
 - revision
- camera-ready submission (if accepted)

A.1 The Purpose of Writing

Types of Scientific Work

- technical reports (just documentation)
- theses (partial degree fulfilment, including defense)
- conference papers (4-10pp, fixed deadline, small contribution, short reviewing cycle, travel + presentation)
- journal papers (8-30pp, solid technical contribution, multiple reviewing cycles, deadline only for special issues)
- books / book chapters

Not Scientific Work

- blogs
- manuals / online-tutorials
- web pages

A.1 The Purpose of Writing

Reasons for Rejection / for Bad Grades

- deadline missed (avoid at any cost!)
- no technical contribution
- not appropriate for audience / for purpose
- lacking structure
- technical errors
- bad writing
- submission requirements not met (too long / short, etc.)
- other papers/theses are (much) better

A.2 Developing Ideas



How to Find a Topic

- come up with something fancy (really crazy ideas often lead to amazing results and great scientific discoveries)
- study related work (Is your idea new? Can use related work?)
- run experiments / analyze (Avoid risks before you start!)
- how can you sell it?

Also Worth Trying

- does your company have open research problems
- ask colleagues / profs
- web search within your area of interest
- brain storming (team work)

A.2 Developing Ideas

Scientific Contribution

- What is the main contribution?
 - a novel algorithm / method
 - a new way of looking at things
 - survey / comparison of existing methods
- How does it compare to related work?
 - efficiency, robustness, quality
 - possibilities and limitations
- What are the expected outcomes?

A.2 Developing Ideas

Before You Start Writing

- produce a proof of concept / numerical examples
- produce images
- outline structure of thesis/paper
 - name sections
 - itemize content
 - add hand-drawn figures
- be aware of **tools** (LaTeX, style documents, etc.)
<http://www.maths.tcd.ie/~dwilkins/LaTeXPrimer>
<http://nwalsh.com/tex/texhelp/ltx-2.html>
Aulis: MI_STYLEDOKUMENTE_4_WISS_ARBEITEN

A.2 Developing Ideas

Start Writing

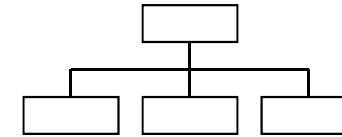
- have the complete paper/thesis in your mind
- fill in contents (in meaningful order)
 - place images / figures
 - write sections
 - add more figures (reference all in text)
- proof-read
 - does it sell / is it appropriate for event
 - check spelling / cross references

A.2 Developing Ideas

Tools to Facilitate Writing (besides LaTeX)

- digital libraries
 - public (<http://citeseer.ist.psu.edu> , <https://dblp.uni-trier.de>)
 - ACM, IEEE, ... (access via the library system)
 - papers are often on authors' homepages
 - in a web search, add "pdf" or use <https://scholar.google.com>
 - online dictionaries (<http://dict.leo.org> , <https://translate.google.com>)
- tools for generating figures (Matlab, Python, ...)
- spell checker

A.3 Structure



A Scientific Document may Contain:

- abstract
- introduction / motivation
- related work / state of the art / fundamentals
- technical content (“the meat”)
- numerical examples / results / analysis
- conclusions, acknowledgements (if any)
- references

A.3 Structure

Abstract

- short (200-400 words)
- contains main point of the thesis/paper
 - what (contribution + results)
 - how (brief summary of method)
- should motivate so. to read your work
- should tell reviewers/supervisors what you contribute

A.3 Structure

Introduction / Motivation

- problem statement (attention getter)
 - can already review some previous work
 - should motivate your claim
- claim
 - summarize your contribution
 - show why it is important
- preview the contents of your work
 - should motivate so. to read on...

A.3 Structure

Related Work

- background, if necessary
- summarize competing approaches
- differences wrt. your method
- again, mention your contribution

Hint: You can use related work either for comparison or for improving your method. **Just provide reference!**

A.3 Structure

Original Research and Development

- motivate your approach by figures
(can place a teaser figure on front page)
- provide equations **and** explanation in words
- be aware of addressed reader profile
- focus on important details (**but**: see question below)
- move supplementary material to appendix

Question: Can a skilled graduate student implement your approach from reading your thesis and re-produce your results?
(Should be absolutely, positively answered with **yes!**)

A.3 Structure

Results

- always provide examples
- comparison wrt. other methods
 - can you beat results from previous work?
 - compare to straight-forward method
- evaluate (qualitative, observations, user study, ...)
- limitations + suggestion how to fix these

Quality versus Quantity

Note: You never can solve all problems. Show the quality of your achievements and devise unsolved problems as future work!

A.3 Structure

Conclusions

- short review of method
("tell 'em three times" – Ken Joy, UC Davis)
- achievements
- future work (unsolved problems, but
don't tell all your secrets!)

Compare to Abstract

... and re-write the latter!

A.3 Structure

Acknowledgements

- people who helped besides co-authors
- sources of
 - data sets
 - software packages
 - support of any kind
- your sponsors
("Thanks for the money, guys! Was a lot of fun spending it...")

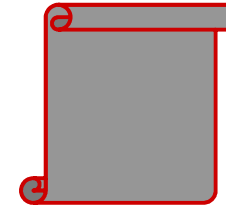
A.3 Structure

References: Check for Completeness

- use bibtex
 - takes care of formatting
 - shows only papers referenced in text
- for each paper
 - authors + title
 - conference / journal + vol + no. / booktitle + eds.
 - page numbers + year

Forbidden: Do not sell web links as literature!

A.4 English Writing



Can write your Thesis in English

- English sentences are **short!**
- be concise – omit dispensable words
- think English – **avoid translations**
 - develop coarse structure in items
 - translate items into sentences
- use either American or British English (not both)

A.4 English Writing

Modularization

- paragraphs
 - carry semantic units
 - never change topic within
 - split long paragraphs
 - avoid redundancy
(only allowed between sections)
- sections / subsections as needed
 - no subsection x.1 without x.2!

A.4 English Writing

Semantic Flow

- smooth semantic structure
- consecutive sentences / paragraphs build on top of each other
- use examples and figures to explain complicated issues
- let the reader know
 - what you do next
 - why you are doing this

A.4 English Writing

A few Notes

- mostly use present, except
 - future work “will be directed at...”
 - previous work “Marching Cubes was invented in 1987”
- say “we” (this includes the reader, do not use “I”)
- never “,” before “that”!
- “-ing” is smarter than “that”:
 - “a method that provides good results”
 - “a method providing good results”

A.4 English Writing

A few more Notes

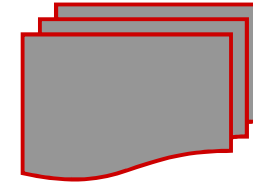
- avoid sloppy writing
(in contrast to presentations where items are preferred)
 - “can’t” → “cannot”
 - “pros and cons” → “pros and contras”
- introduce abbreviations **before** using them
 - “A multi-scale analysis (MSA) is defined as...
Now, we use multiple MSAs ...”

A.4 English Writing

Hyphenation

- overrides right associativity
 - “disabled user interface” = user interface not active
 - “disabled-user interface” = interface for impaired person
- often not unique, but use consistently
 - “coordinate” or “co-ordinate”

A.5 Review Your Work



Last Improvements

- finish thesis/paper well before deadline
- let other people proof-read
- review your thesis
- identify and improve weak points
- check spelling
- submit well before deadline

A.5 Review Your Work

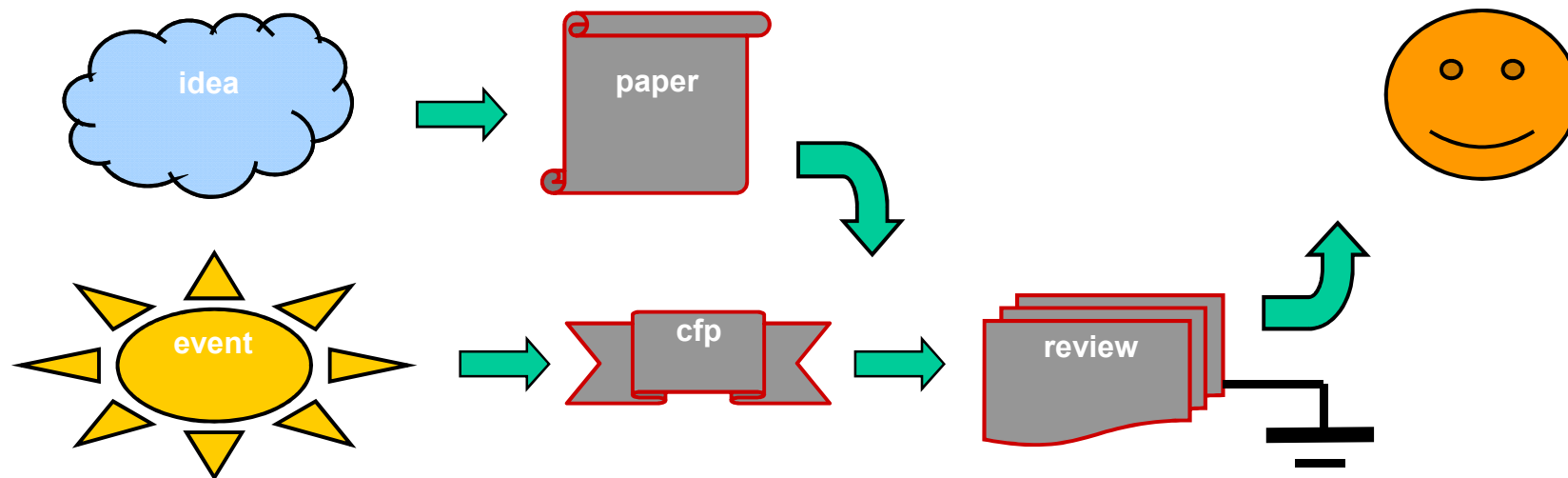
Example Review Form (Conference Papers)

- Summarize the paper (sanity check to see whether the reviewer understood the paper)
- Is the paper appropriate for event?
- Does it advance the state of art? (Does it provide a significant, novel contribution?)
- Is the paper well structured? Is it easy to read?
- is it technically sound? (Report Errors)
- Are the results reproducible?
- Are important references missing?
- Do you recommend it for publication?

A.6 Summary

Publish Your Work

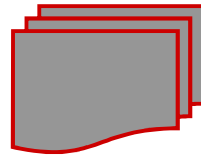
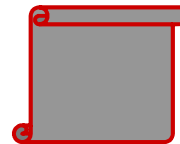
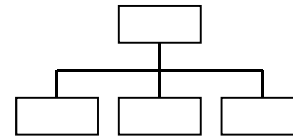
- Your thesis advances the state of the art?
- Why not publish your work at a small conference (ask your professor for travel funding)?
- Understand the process. Be part of it!



A.6 Summary

Publish Your Work

- come up with a novel idea
- find the proper event
- run experiments / compare
- put results into images
- place structure around them
- fill in text
- proof-read + submit



A.6 Summary

References (and Online Sources)

- Justin Zobel, **Writing for Computer Science**, 3rd edition, Springer, 2014.
- Jim Kajiya, How to Get Your SIGGRAPH Paper Rejected
<https://www.siggraph.org/sites/default/files/kajiya.pdf>
- Melissa Bender, How to Give a Professional Talk
https://urc.ucdavis.edu/sites/g/files/dgvnsk3561/files/local_resources/documents/pdf_documents/WAC_Professional_Talk_Bender.pdf
- Charles van Loan, The Short Talk
<https://www.cmpe.boun.edu.tr/~cemgil/Courses/cmpe700/ShortTalk.htm>
- For further **Advice on Research and Writing**, see
<http://www.cs.cmu.edu/afs/cs.cmu.edu/user/mleone/web/how-to.html>