How to write a good **Journal of Solid State Circuits** paper

Bram Nauta
JSSC Editor in Chief
University of Twente, The Netherlands
b.nauta@utwente.nl
http://icd.ewi.utwente.nl

November 2008

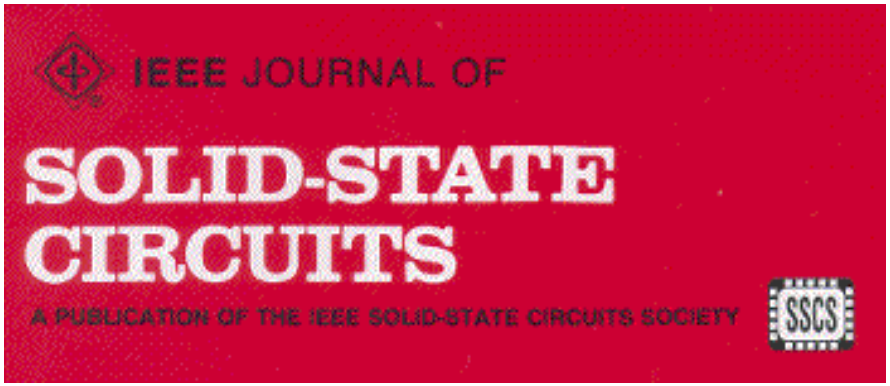
[A-SSCC 2008, Fukuoka, Japan]

Outline

- About the Journal
  - Yesterday and today
  - Journal versus Conference
  - Organization of the Journal
  - What kind of papers?
- Writing tips
  - Paper outline
  - General tips
- How NOT to write a JSSC paper

Outline

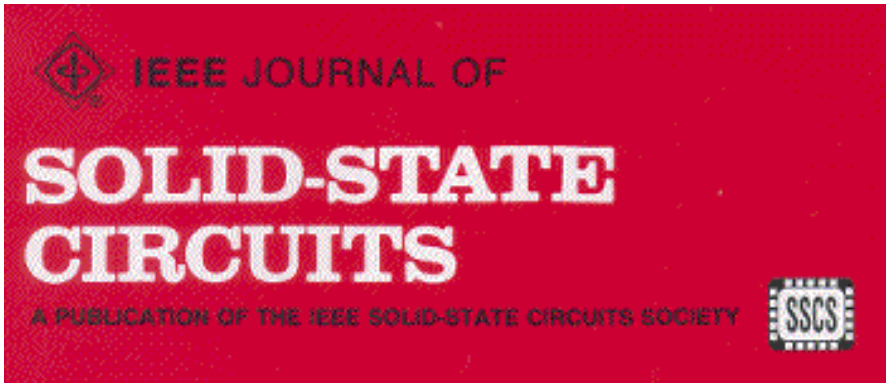
- **About the Journal**
  - Yesterday and today
  - Journal versus Conference
  - Organization of the Journal
  - What kind of papers?
- Writing tips
  - Paper outline
  - General tips
- How NOT to write a JSSC paper



History

- Established in 1966
  - 4 issues per year
- Volume 1, nr 1: ISSCC 1966 issue

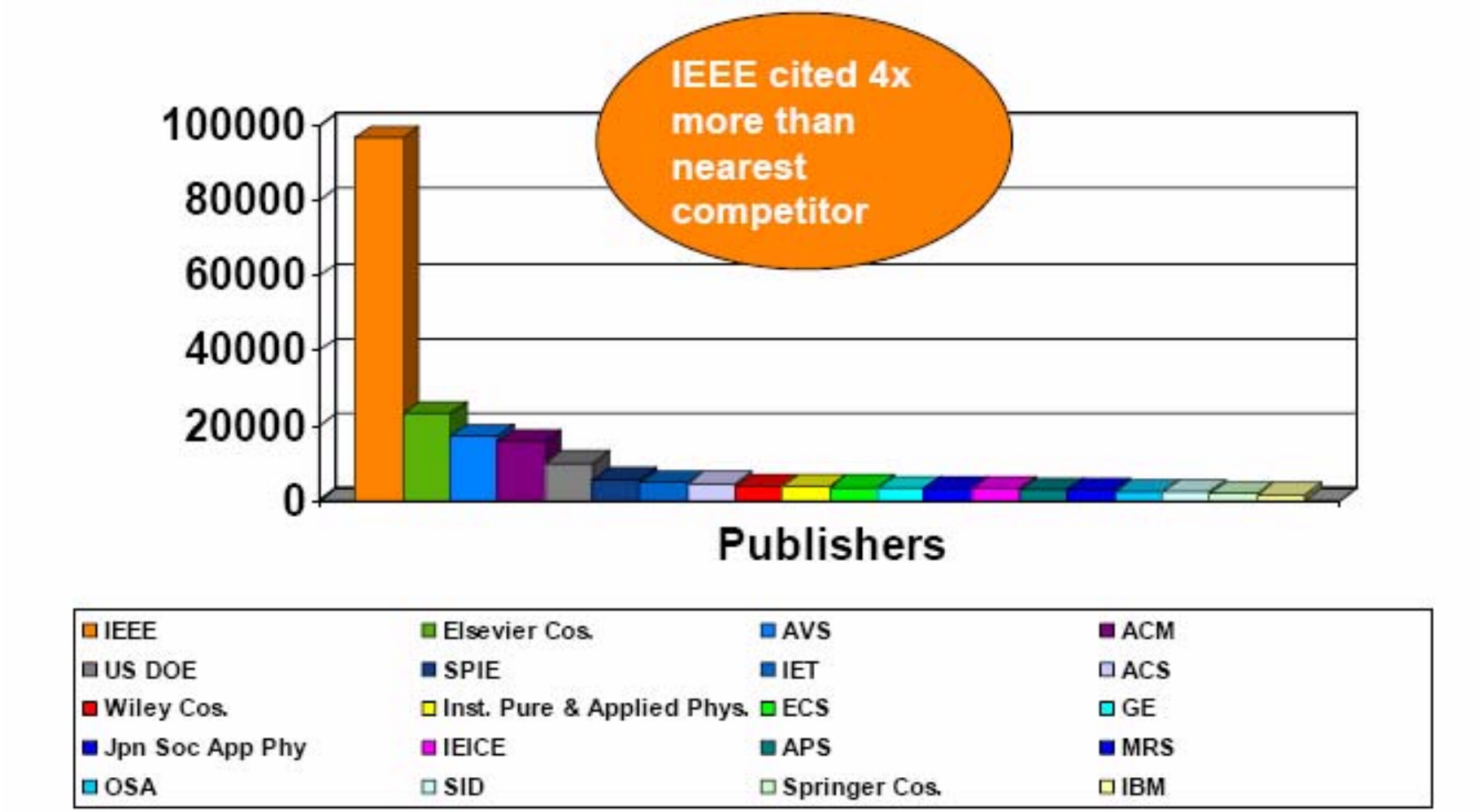
- Purpose= archive



TODAY

- ***The*** Nr 1 IEEE Journal
- By far: most downloaded IEEE Journal
- By far: most cited in all US Patents
  - Over all technical disciplines

References in patents from top 25 companies to top 20 publishers



Top cited IEEE Journals in patents

Rank	Title	Cites
1	**IEEE Journal of Solid-State Circuits**	**14,765**
2	IEEE Transactions on Electron Devices	8,824
3	IEEE Transactions on Communications	8,678
4	IEEE Photonics Technology Letters	8,383
5	Journal of Lightwave Technology	5,989
6	Proceedings of the IEEE	5,338
7	IEEE Transactions on Magnetics	5,071
8	IEEE Transactions on Computing	4,393
9	IEEE J on Selected Areas in Communications	4,148

Outline

- About the Journal
  - Yesterday and today
  - **Journal versus Conference**
  - Organization of the Journal
  - What kind of papers?
- Writing tips
  - Paper outline
  - General tips
- How NOT to write a JSSC paper

Conferences

- Fast publication
- Usually a smaller idea
  - Benchmark: Known circuit in new technology
  - Smaller trick can be o.k.
  - depends on conference
- Just accept or reject; no rewrite
  - It may be incomplete
  - It may lack key references
- Good for networking and Q&A
- SSCS conferences are available on IEEExplore

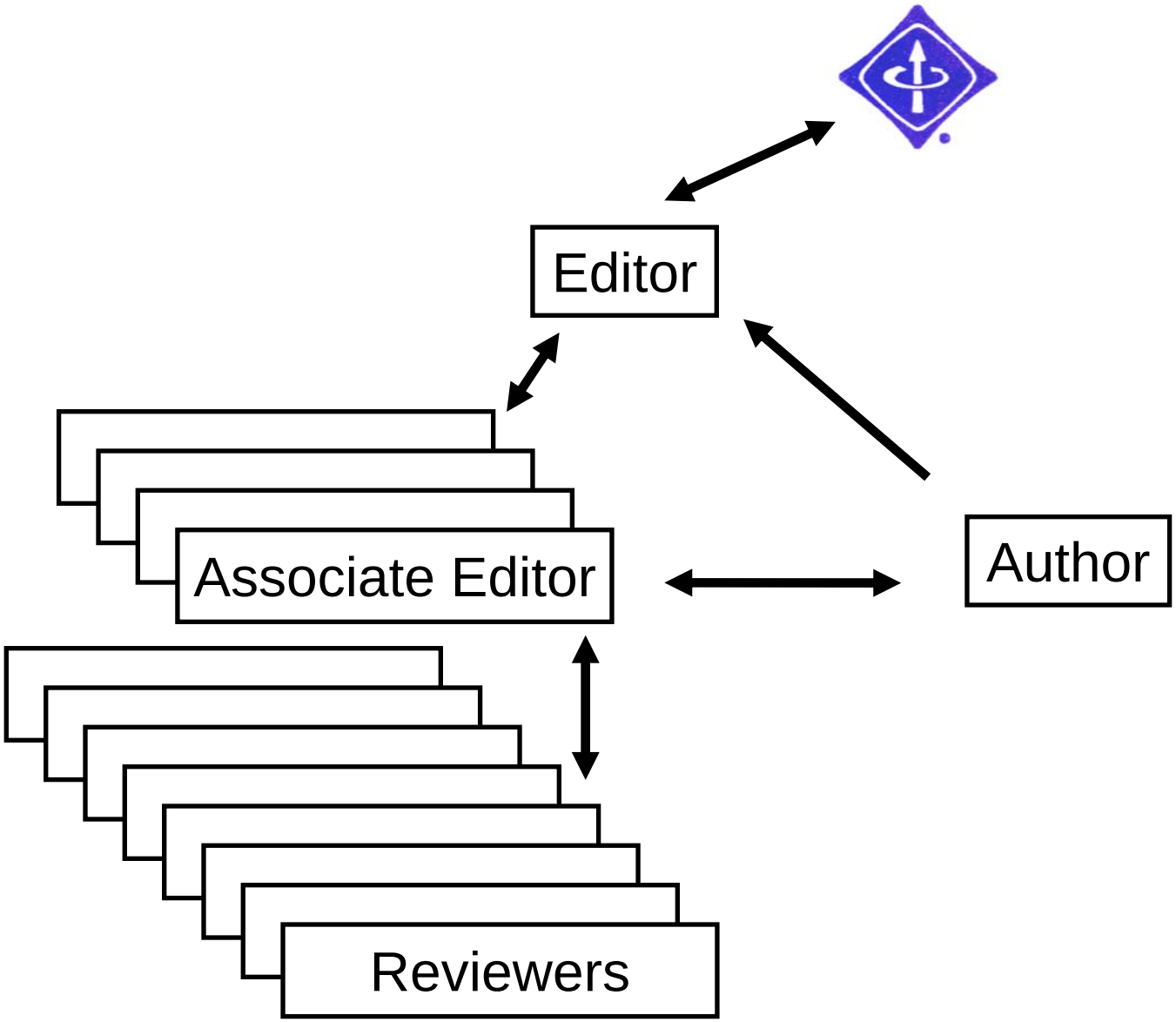
Journal publication

- Academic reputation
  - Journals can have more status than conferences
    - Depends on the field
- Reviewed Journal gives a “quality stamp”
  - Reviewers demand corrections & clarifications
- Archive your work
  - Wider scope
  - More theory
  - More technical information
  - More Educational
  - More references

Outline

- About the Journal
  - Yesterday and today
  - Journal versus Conference
  - **Organization of the Journal**
  - What kind of papers?
- Writing tips
  - Paper outline
  - General tips
- How NOT to write a JSSC paper

Organization regular JSSC papers



Associate Editors

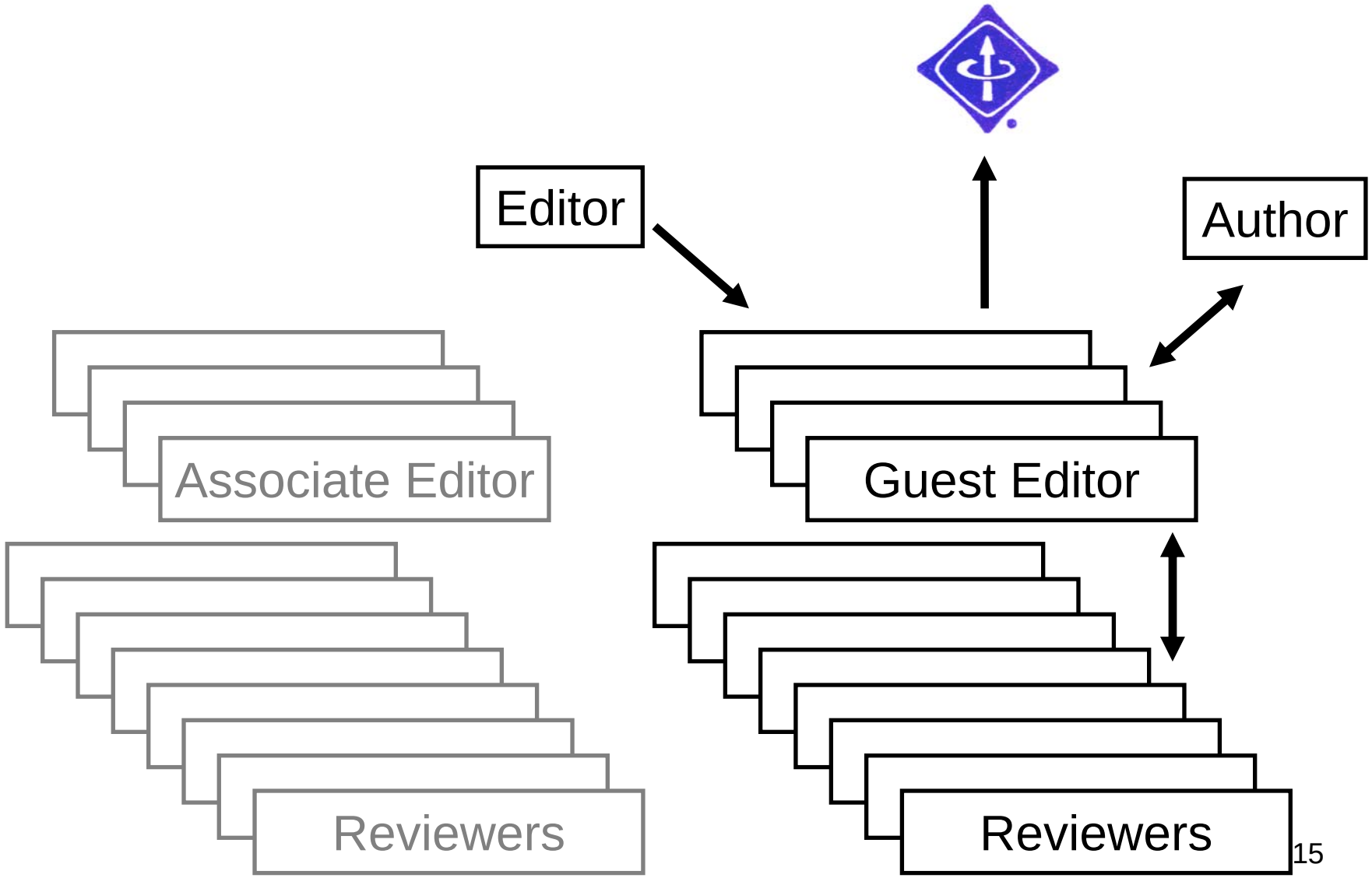
- **Baas**, Bevan
- **Behzad**, Arya
- **Flynn**, Michael
- **Gharpurey**, Ranjit
- **Gillingham**, Peter
- **Halonen,** Kari
- **Karanicolas**, Andrew
- **Kim**, Beomsup,
- **Leenaerts**, Domine
- **Liu**, Shen-Iuan,

Mok, Philip
Nairn David
Natarajan Shreedhar
Rusu, Stefan
Razavi, Behzad,
Savoj, Jafar
Shaeffer, Derek
Shepard, ken
Young, Darrin

Special Issues on conferences

• December	ISSCC-analog, RF	(issue)
• January	ISSCC-dig+rest	(issue)
• April	VLSI	(issue)
• May	RFIC	(section)
• July	ESSCIRC	(issue)
• August	CICC	(issue)
• September	BCTM	(section)
• October	CSIC	(section)
• November	A-SSC	(section)

Organization special Issue



Procedure (regular papers)

- Author submits manuscript to Editor
- Editor sends to Associate editor
- Associate Editor sends to reviewers
- Associate Editor makes decision:
  - AWR accept with revisions ☺
  - REJ reject
  - REF refer to other Journal

  Its not a democratic process!!!!!!!!!!

Procedure (regular papers)

- Author rewrites
  - Give list of how you changed manuscript based on reviewers comments
  - Do not reply to reviewer but change your manuscript
- Associate Editor makes final decision
- OR: Associate Editor organizes second review

- Author submits final package to Associate Editor
- Associate Editor inspects and forwards to Editor
- Editor compiles issues and sends to IEEE

Time schedule (regular papers)

- Delay to first decision ~100 days
- Delay author rewrite ~100 days
- Publication delay ~140 days

- Total delay ~340 days

Origin of regular papers

- 365 submissions/year: 1/day
  - Asia 40% (Taiwanese Universities)
  - USA 25%
  - EU 25%
  - ROW 10%

- Same regional distribution as ISSCC
- 90% is analog/RF!!

Accept/reject regular papers

- Accept 36%
- Reject 58%
- Refer to other Journal 3%
- Withdrawn 3%

- Main reject reasons:
  - Not enough **novelty/innovation**
  - Not enough news w.r.t. **prepublication**

Outline

- About the Journal
  - Yesterday and today
  - Journal versus Conference
  - Organization of the Journal
  - **What kind of papers?**
- Writing tips
  - Paper outline
  - General tips
- How NOT to write a JSSC paper

What papers are good for JSSC?

- IC Implementation oriented
  - Not: microwave PCP/ modeling/ device only
- Not too much theory (Better use TCAS)
- Integrated Circuit needed
- But to have an IC is not enough!

The work must be of HIGH Quality

What is high quality?

- Must describe an **INNOVATIVE IDEA**
  - Not just a permutation
  - Not a know circuit in new technology
  - Not a combination of known techniques
  - But a real new concept / invention
- AND idea must be proven on IC
- AND idea must significantly advance state-of- art

Prepublication

- ~90% of submitted papers have prepublication at conference(s)
  - That's ok
- Conferences are available on IEEExplore
- So a JSSCC paper should add significant information to the prepublications

Prepublication policy

- ***"A JSSCC paper should be worth reading for a person who has read the conference paper."***
  - Better description of state-of-art
  - More theory + proof of concept
  - More measurements
  - More discussion (mismatch, no-idealities etc)
  - More benchmark, more discussion
  - More references

Prepublication policy

- NOT each conference paper deserves to be a JSSC paper
- NOR each work without prepublication deserves to be a JSSC paper

- It’s a delicate thing, but all about **QUALITY**

Outline

- About the Journal
  - Yesterday and today
  - Journal versus Conference
  - Organization of the Journal
  - What kind of papers?
- **Writing tips**
  - Paper outline
  - General tips
- How NOT to write a JSSC paper

A Typical paper outline

- Title
- Abstract
- Introduction
- Body
- Experimental results
- Discussion
- Conclusion
- references

The Title

- Must describe the paper
- Not too vague
  - "A novel receiver"
    - Do not use *"novel"* anyway
  - "5-GHz RF Frontends for Ultra-Low-Voltage and Ultra-Low-Power Operations"
    - How much is is Ultra?
- But exactly what is really new:
  - "Noise canceling technique for wideband receivers"
- Or exactly what is achieved
  - "A 1.5GHz 1.3dB NF, 10mW down converter in 65nm CMOS for GPS applications"
- Or both!

Abstract

- 1 paragraph
- Exactly what paper is about
- Can have overlap with conclusions
- Keywords, indexing terms
  - Use many!!
  - So your paper can be found
  - You will be cited a lot

Introduction

- Describe the problem you solve
  - Open the subject
  - Zoom in step by step
  - Describe your assumptions
  - Each step is one paragraph
- Describe the state-of-art
  - Use plenty of references
- Tell basic your idea
  - This motivates the reader to continue
  - Cite your prepublications and tell the difference
- Give outline

The body

- Explain your key idea
- Build up Step by step
  - One thinking step at the time
  - Each step is one paragraph
- Proof that it makes sense
  - Use mathematics
  - Give exactly your boundary conditions
  - Give results in comprehensive way

The body

- Be self-critical and realistic:
  - does it really make sense?
- E.g. for a linearity improvement technique:
  - If power dissipation is larger
  - And noise is also larger
  - And you know that P~SNR: does this make sense?
- Is it just the technology or your smartness?
  - E.g. speed ~f_T or f_{max}
- Are practical boundary conditions met?
  - VCO @ high frequency but Pout=-30dBm

Experimental Results

- Describe exactly what has been measured and how.
  - Describe setup
  - “Bio Biased”? (manual tweaking and tuning)
  - Probe or PCB?
  - What equipment?
  - How many samples?
  - PVT?
  - Batch to batch spread?
- Experiment must be repeatable and of practical use (e.g. for industry)

Experimental Results

- Compare with theory / simulations
- Does it prove your idea and theory?
- Always tell if a result is measures. Simulated or calculated.

“Figure x shows the noisefigure versus frequency”

➡ is this measured? Simulated? Calculated? Estimated?

IC realization

- Give chip photograph
  - Dimensions
  - What is what
- Give technology + options

Discuss results

- Compare to state-of-art in fair way
  - Show all relevant data + papers
  - A table can help
    - although measurements are hard to compare
- Use common FoM definitions
  - ADC, VCO, filter
- Be careful to define your own FoM
  - Do not misuse FoM for showing off
  - Power ~ SNR. BW makes sense
  - Power/bondpad is NOT a good FoM!!

Discuss results

- Help the reader to interpret the results
- Absolute accuracy needed?
  - show many samples, proof batch to batch robustness
- Matching needed?
  - show many samples
- Calibrated circuits?
  - describe what input signal is used/required. When does it go wrong? How realistic is it?

Discuss Results:

A useless PLL benchmark:

Specifications	Unit	This Work	[6]	[13]
Technology	—	0.18-μm CMOS	0.18-μm CMOS	0.25-μm SiGe BiCMOS
Frequency	GHz	10.3	10.0	10.0
Supply Voltage	V	1.8	1.8	3.3
Power Consumption	mW	113	—	—
Locking Range	GHz	10.1 ~ 11	—	—
Peak-to-Peak Jitter	ps	3.72	6.5	4.8
RMS Jitter	ps	0.43	0.6	0.4

Conclusions

- Start writing with this
- First make a bullet list for yourself
  - A hand full of bullets
  - So you know where to write towards
  - This gives your paper focus
- Conclusion should be readable without reading the whole paper
- Convince the reader

What did we learn?

References

- Include latest state of the art
  - For benchmark
- But also refer to the original papers
  - Go back in time!
  - Most references are younger than 5 years ☹
  - While most ideas are much older!
- Textbooks are useful too

Outline

- About the Journal
  - Yesterday and today
  - Journal versus Conference
  - Organization of the Journal
  - What kind of papers?
- Writing tips
  - Paper outline
  - **General tips**
- How NOT to write a JSSC paper

Writing tips:

A well written paper gives the impression of a good idea

Writing Tips

- If a paper is too complex:
  - Reviewers don't understand it
  - Reviewers don’t believe it
  - Reviewers will not like it
- If a paper is too simplistic
  - Reviewers think its nothing special
  - Even if the results are good

General writing tips

- Make your problem relevant
- Start with the “big picture”
- Take the reader by the hand
  - Step by step explanation
- Highlight innovation
- Do not give too many equations
- Do not give too much theoretical details
- Do not try to make a tutorial

General writing tips

- Do not use “very” but give the numbers
- Avoid to use “novel”
  - everything you don´t cite should be novel
- Use short sentences
- Use simple words
- One point per paragraph
  - First or last sentence is most important
  - The rest is explanation

General writing tips

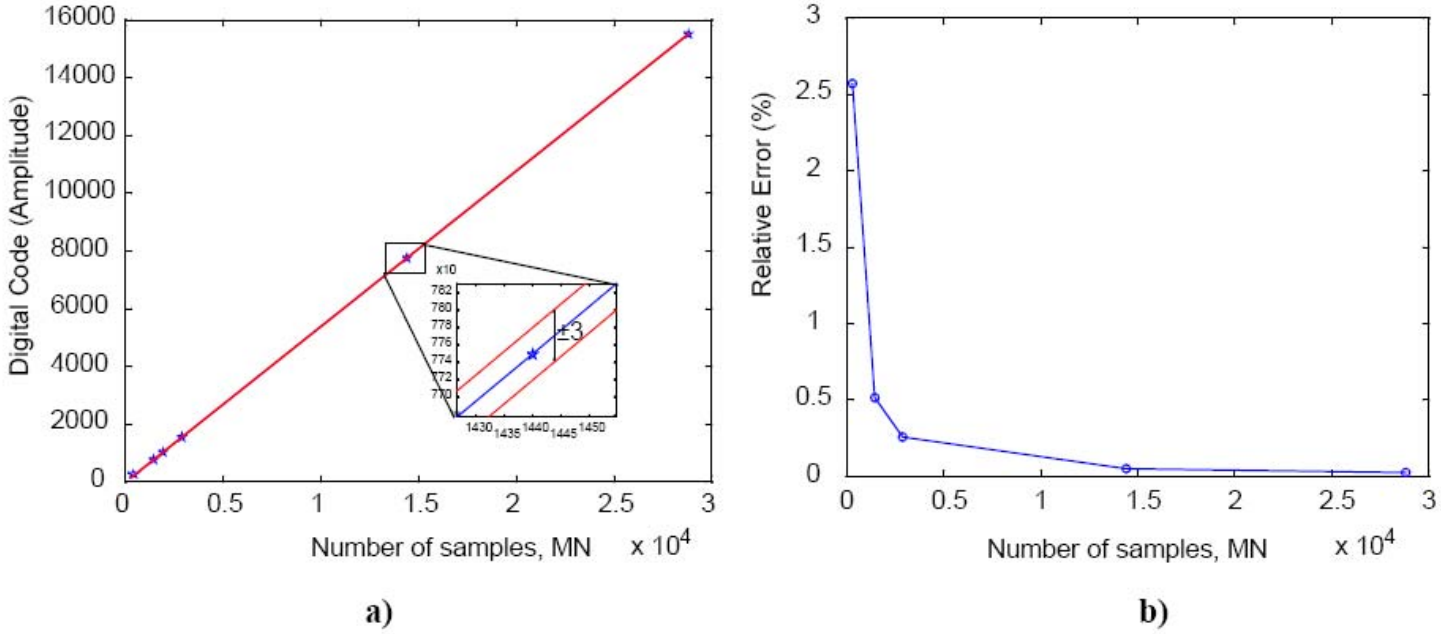
- If you are stuck:
  - Tell a friend what you did.
  - Use the words & slides like on your conference paper
  - Polish the text later
- Let a fellow student read & comment
- Ask native speaker to correct language
- Polish, Polish, Polish
  - Reviewers hate mistakes!!
  - It iz raely anojing to raed tekst width misstakes

Figures

- Make the figures like a cartoon
  - Reader can understand idea by looking at figures + caption only
- Spend a lot of time to make good figures
  - Papers with bad figures almost always get rejected

Figures

- Must be readable in single column:
- Not good:



a) b)

Figure 13

Outline

- About the Journal
  - Yesterday and today
  - Journal versus Conference
  - Organization of the Journal
  - What kind of papers?
- Writing tips
  - Paper outline
  - General tips
- **How NOT to write a JSSC paper**

Do NOT

- Publish the same material elsewhere
  - Reviewers+readers always see this; its unethical
- Change your paper after acceptance and before publication
  - E.g. remove reference to competitor
  - Reviewers always see this
- Use someone else´s ideas
  - “Someone else” is reading too
- Hide “unpleasant” measurements

Do NOT

- Fabricate or falsify results
  - Not tune bias for each measuring point
  - Not make few chips and measure different parameters on different chips
  - Or even completely falsify results

Outline

- About the Journal
  - Yesterday and today
  - Journal versus Conference
  - Organization of the Journal
  - What kind of papers?
- Writing tips
  - Paper outline
  - General tips
- How NOT to write a JSSC paper

Summary

- IEEE Journal of Solid-State Circuit
  - Most downloaded, most cited in patents
- Needs an Innovative new idea
  - Working silicon is not enough
  - Must improve state-of-art
- Needs new material after prepublication
- Reviewers are demanding
- Your writing technique can help