

Writing Good Software Engineering Research Papers

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Agenda

- Introdução
- Questões de interesse
 - *What, precisely, was your contribution?*
 - *What is your new result?*
 - *Why should the reader believe your result?*
 - *How do you combine the elements into a research strategy?*
- Importância do *Abstract*
- Questionamentos sobre o relatório apresentado

Introdução

- Engenheiros de software usualmente escrevem artigos científicos para divulgar resultados de suas pesquisas
- Um bom artigo deve ter respostas para:
 - ***What, precisely, was your contribution?***
 - *What question did you answer?*
 - *Why should the reader care?*
 - *What larger question does this address?*

Introdução

- **What is your new result?**
 - What new knowledge have you contributed that the reader can use elsewhere?
 - What previous work (yours or someone else's) do you build on?
 - How is your result different from and better than this prior work?
 - What, precisely and in detail, is your new result?

Introdução

- ***Why should the reader believe your result?***
 - *What standard should be used to evaluate your claim?*
 - *What concrete evidence shows that your result satisfies your claim?*
- Os resumos dos *papers* submetidos na ICSE 2002 foram analisados, juntamente com os relatórios dos avaliadores sobre quais *papers* deveriam ou não serem aceitos

What, precisely, was your contribution?

- *“Before reporting what you did, explain what problem you set out to solve or what question you set out to answer — and why this is important.”*
- Quais tipos de perguntas os engenheiros de software procuram responder?
 - De maneira geral, engenheiros de software (pesquisadores) procuram melhores maneiras para desenvolver e/ou avaliar softwares

What, precisely, was your contribution?

Table 1. Types of software engineering research questions

Type of question	Examples
Method or means of development	How can we do/create/modify/evolve (or automate doing) X? What is a better way to do/create/modify/evolve X?
Method for analysis or evaluation	How can I evaluate the quality/correctness of X? How do I choose between X and Y?
Design, evaluation, or analysis of a particular instance	How good is Y? What is property X of artifact/method Y? What is a (better) design, implementation, maintenance, or adaptation for application X? How does X compare to Y? What is the current state of X / practice of Y?
Generalization or characterization	Given X, what will Y (necessarily) be? What, exactly, do we mean by X? What are its important characteristics? What is a good formal/empirical model for X? What are the varieties of X, how are they related?
Feasibility study or exploration	Does X even exist, and if so what is it like? Is it possible to accomplish X at all?

What, precisely, was your contribution?

Table 2. Types of research questions represented in ICSE 2002 submissions and acceptances

Type of question	Submitted	Accepted	Ratio Acc/Sub
Method or means of development	142(48%)	18 (42%)	(13%)
Method for analysis or evaluation	95 (32%)	19 (44%)	(20%)
Design, evaluation, or analysis of a particular instance	43 (14%)	5 (12%)	(12%)
Generalization or characterization	18 (6%)	1 (2%)	(6%)
Feasibility study or exploration	0 (0%)	0 (0%)	(0%)
TOTAL	298(100.0%)	43 (100.0%)	(14%)

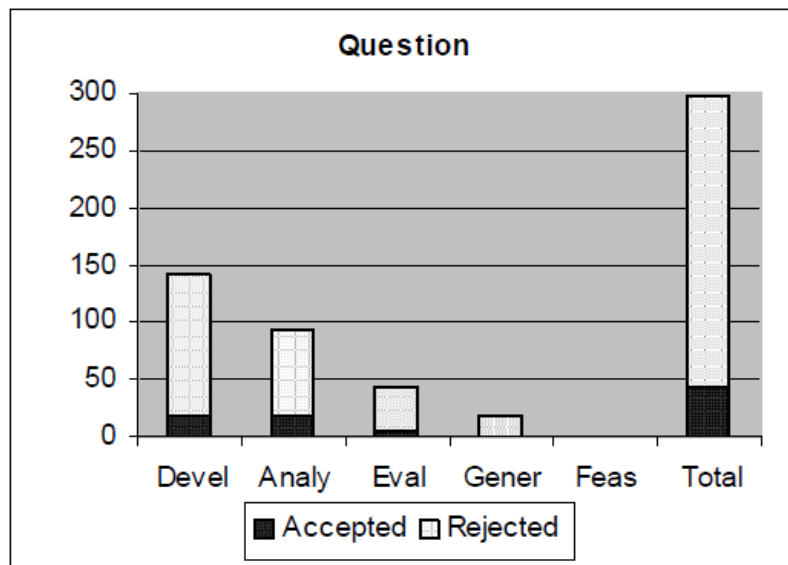


Figure 1. Counts of acceptances and rejections by type of research question

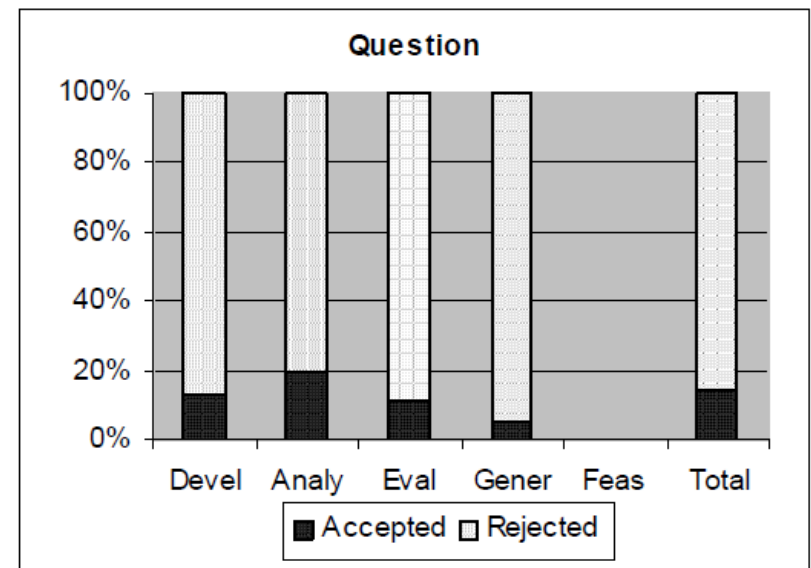


Figure 2. Distribution of acceptances and rejections by type of research question

What, precisely, was your contribution?

- O que o comitê de programa procura?
 - Descrição clara do problema específico que você está resolvendo (Qual questão sobre desenvolvimento de software você está respondendo?)
 - Explicação sobre como a resposta ajudará a resolver um problema importante de engenharia de software

What, precisely, was your contribution?

- O comitê de programa **não** deve ter dificuldade para identificar se você
 - Desenvolveu uma nova técnica de avaliação e demonstrou com um exemplo
 - Aplicou uma técnica que você desenvolveu no ano anterior em um novo exemplo real
 - Avaliou a aplicação de uma técnica já bem conhecida e estabelecida

What is your new result?

- *“Explain precisely what you have contributed to the store of software engineering knowledge and how this is useful beyond your own project”*
- Que tipos de resultados engenheiros de software produzem?
 - Procedimentos e técnicas para desenvolvimento ou análise
 - Modelos que generalizam exemplos específicos
 - Ferramentas, soluções ou resultados específicos sobre sistemas particulares

What is your new result?

- Tipos de resultado em engenharia de software
 - Procedimento ou técnica
 - Qualitativo ou modelo descritivo
 - Modelos empíricos
 - Modelos analíticos
 - Ferramentas ou notações
 - Soluções específicas, protótipos, respostas ou julgamento
 - Relatório

What is your new result?

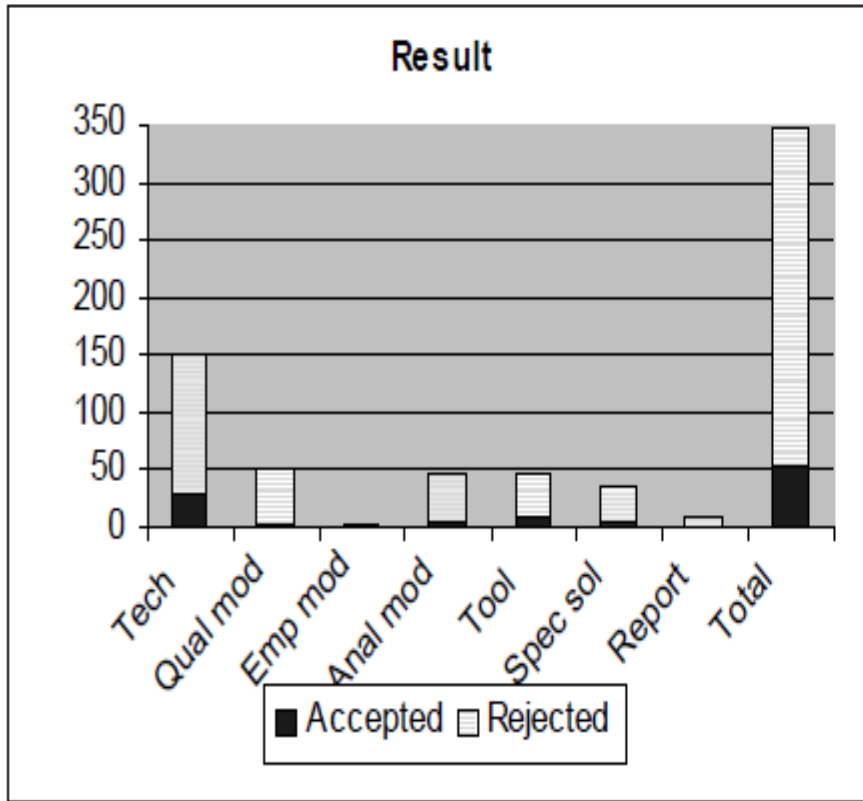


Figure 3. Counts of acceptances and rejections by type of result

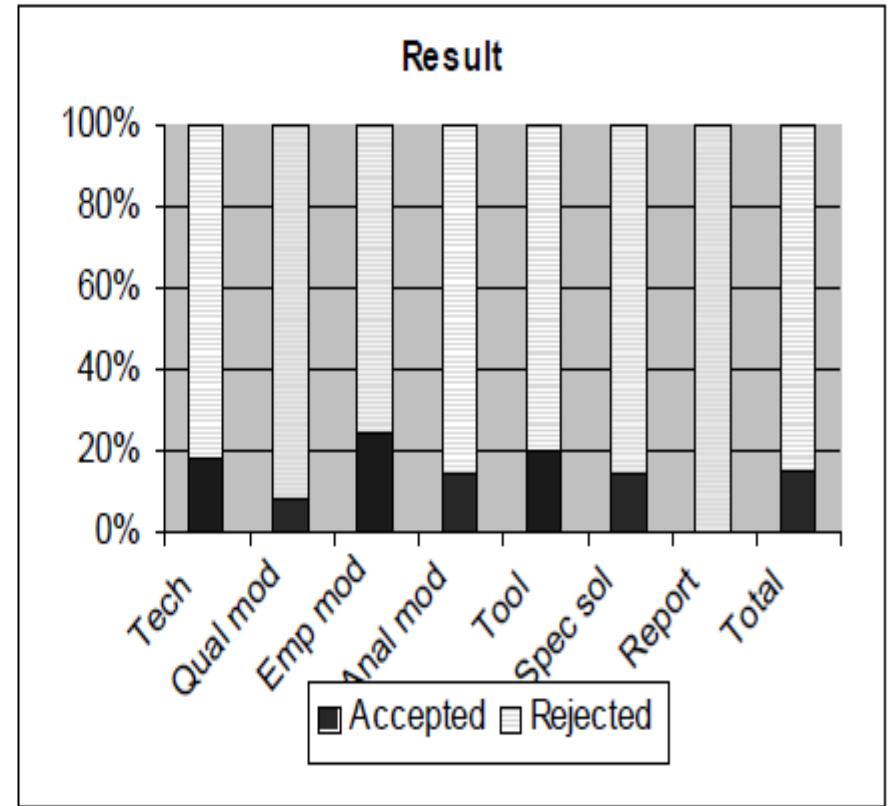


Figure 4. Distribution of acceptances and rejections by type of result

What is your new result?

- *What do program committees look for?*
 - Resultados que, **de forma significativa**, contribuam para
 - Aumentar nossa capacidade de desenvolver e manter software
 - Conhecer a qualidade dos softwares que desenvolvemos
 - Reconhecer princípios gerais sobre software
 - Analisar propriedades de softwares

What is your new result?

- Cuidado com algumas “armadilhas”
 - *If your result ought to **work on large systems***
 - *If you claim your **method is "automatic"***
 - *If you claim your **result is "distributed"***
 - *If you're proposing a **new notation for an old problem***
 - *If your paper is an "**experience report**", show how your experience should increase the reader's confidence for applications beyond the example of the paper*

What is your new result?

Awful	▼	<ul style="list-style-type: none">• I completely and generally solved ... (unless you actually did!)
Bad	▼	<ul style="list-style-type: none">• I worked on galumphing. (or studied, investigated, sought, explored)
Poor	▼	<ul style="list-style-type: none">• I worked on improving galumphing. (or contributed to, participated in, helped with)
Good	▲	<ul style="list-style-type: none">• I showed the feasibility of composing blitzing with flitzing.• I significantly improved the accuracy of the standard detector. (or proved, demonstrated, created, established, found, developed)
Better	▲	<ul style="list-style-type: none">• I automated the production of flitz tables from specifications.• With a novel application of the blivet transform, I achieved a 10% increase in speed and a 15% improvement in coverage over the standard method.

What is your new result?

Explain the relation to other work clearly ...

Awful	▼	The galumphing problem has attracted much attention [3,8,10,18,26,32,37]
Bad	▼	Smith [36] and Jones [27] worked on galumphing.
Poor	▼	Smith [36] addressed galumphing by blitzing, whereas Jones [27] took a flitzing approach.
Good	▲	Smith's blitzing approach to galumphing [36] achieved 60% coverage [39]. Jones [27] achieved 80% by flitzing, but only for pointer-free cases [16].
Better	▲	Smith's blitzing approach to galumphing [36] achieved 60% coverage [39]. Jones [27] achieved 80% by flitzing, but only for pointer-free cases [16]. We modified the blitzing approach to use the kernel representation of flitzing and achieved 90% coverage while relaxing the restriction so that only cyclic data structures are prohibited.

Why should the reader believe your result?

- Types of software engineering research validation
 - Analysis
 - Evaluation
 - Experience
 - Example
 - Persuasion
 - Blatant assertion
-

Why should the reader believe your result?

Table 6. Types of research validation represented in ICSE 2002 submissions and acceptances

Type of validation	Submitted	Accepted	Ratio Acc/Sub
Analysis	48 (16%)	11 (26%)	23%
Evaluation	21 (7%)	1 (2%)	5%
Experience	34 (11%)	8 (19%)	24%
Example	82 (27%)	16 (37%)	20%
Some example, can't tell whether it's toy or actual use	6 (2%)	1 (2%)	17%
Persuasion	25 (8%)	0 (0.0%)	0%
No mention of validation in abstract	84 (28%)	6 (14%)	7%
TOTAL	300(100.0%)	43 (100.0%)	14%

Why should the reader believe your result?

- Conselhos para evitar problemas 1/2
 - ***If you claim to improve on prior art, compare your result objectively to the prior art***
 - ***If you used an analysis technique, follow the rules of that analysis technique***
 - ***If you offer practical experience as evidence for your result, establish the effect your research has***
 - ***If you performed a controlled experiment, explain the experimental design***

Why should the reader believe your result?

- Conselhos para evitar problemas 2/2
 - ***If you performed an empirical study, explain what you measured, how you analyzed it, and what you concluded***
 - ***If you use a small example for explaining the result, provide additional evidence of its practical use and scalability***

How do you combine the elements into a research strategy?

- Look carefully at the short statement of the result (e.g., "I found an efficient and complete method...")
- Ask of each clause whether it is a global statement ("always", "fully"), a qualified statement ("a 25% improvement", "for noncyclic structures..."), or an existential statement ("we found an instance of...")

Global statements → analytic validation

Qualified statements → evaluation or careful examination of experience

Existential statements → single positive example

Does the abstract matter?

- “Whether you like it or not, **people judge papers by their abstracts** and read the abstract in order to decide whether to read the whole paper.”
- Common structure of a good abstract:
 - Two or three sentences about the current state of the art
 - One or two sentences about what this paper contributes to improving the situation
 - One or two sentences about the specific result of the paper and the main idea behind it
 - A sentence about how the result is demonstrated or defended

Questions you might ask about this report

- **Is this a sure-fire recipe?**
- **Is ICSE different from other conferences?**
- **What about this report itself?**
 - There is no attempt to show that anyone else can apply the model
 - The model is not justified by any principled analysis
 - Only one conference and one program committee is reflected here
 - The use of abstracts as proxies for full papers is suspect
 - There is little discussion of related work

The End

"Try not. Do, or do not. There is no try." - Yoda