



DIT590 Research Methods & Technical Writing

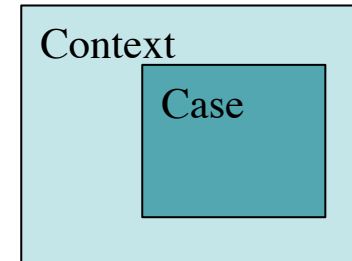
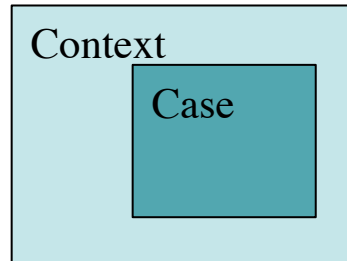
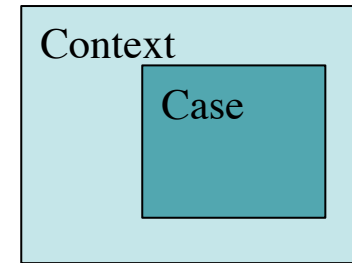
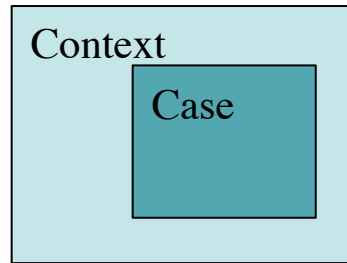
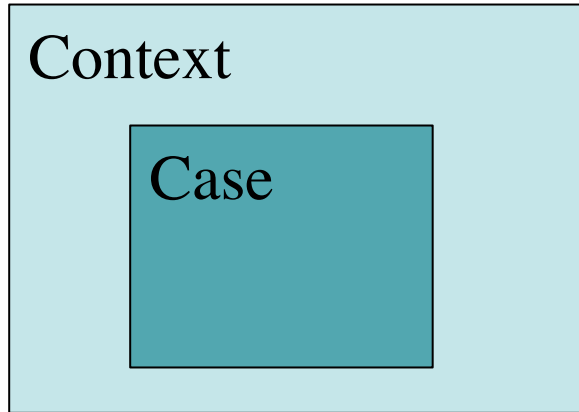
Lecture 7: Writing

Richard Berntsson Svensson

<http://www.rbsv.eu/courses/rmtw>



Re-cap



Design Research
(Hevner et al. 2004)

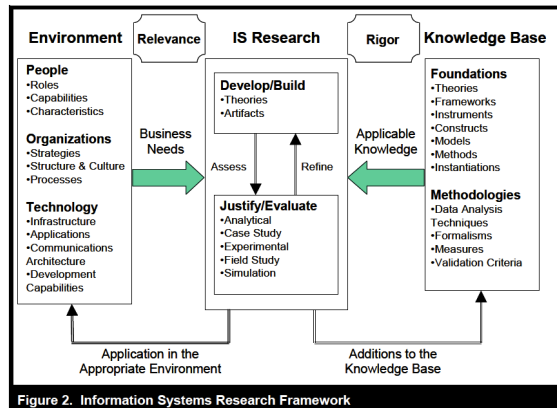
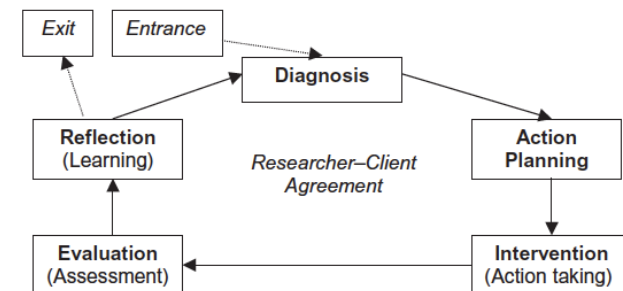


Figure 2. Information Systems Research Framework

Action Research
(Susman & Evered 1978)





Technical Writing





Publish?

- Communicate your findings
 - Publication = ‘finished’ result of scientific research
 - ‘Research is never finished until published’
- Let community know about your work
 - Recognition
- Strengthen CV and career
- Show that you have learnt the skills of research



Whom are you publishing/writing for?

- For the reader, NOT for you
- Paper = Pedagogical explanation of the results
- Golden rules:
 - Know your readers and their background
 - Imagine yourself as a reader
 - Ask yourself questions
 - Is this interesting? Is it relevant? Is this comprehensible?
 - Does this follow from what I have already said?
 - What questions are coming to the readers mind?
 - Do not speak highly of yourself or your work
 - Leave that to the reader
 - Avoid 'strong' adjectives like 'extremely', use balanced language



What to claim in a paper/thesis?

- Typical claims:
 - First time....:
 - Solves a problem for the first time
 - Describes a common problem/process for the first time
 - Improves/Extends existing results/alternatives in 1-2 of dimensions:
 - Behavior: X has (higher quality output/higher success rate/easier to understand) than Y+Z
 - Coverage: X applicable in more situations than Y+Z
 - Efficiency: X is faster or use less resources than Y+Z
 - Usability: X is easier to learn/use than Y+Z



Ten simple rules

- Read many papers, and learn from both the good and the bad work of others
- The more objective you can be about your work, the better that work will ultimately become
- (Good editors and reviewers will be objective about your work)
- If you do not write well in the English language, take lessons early; it will be invaluable later
- (Learn to live with rejection)
- The ingredients of good science are obvious – do not ignore the obvious
- Start writing the paper the day you have the idea of what questions to pursue
- Become a reviewer early
- Decide early where to try to publish your paper
- Quality is everything



How to structure paper/thesis?

- Abstract
- Introduction
- Related work / Background
- Methodology
- Results
- Discussion
- Conclusions
- Acknowledgement
- References
- (Appendix)



Outline for Research Papers

- **Abstract**
 - Brief summary of the whole paper
 - Background - 1-2 sentences Area of concern
 - Objective & Method - 1 sentence Problem and 1-2 sentences Method & Data Collection
 - Results - 2-3 sentences Data Analysis
 - Conclusions - 1-2 sentences conclusions and Contributions
- **1. Introduction**
 - 1st paragraph: Starts with Area of concern and ends with Problem.
 - 2nd paragraph: Starts with Framework to use and ends with RQ.
 - 3rd paragraph: Starts with Method, describes how Data Collection will be done, and ends with how Data Analysis will be done.
 - 4th paragraph: Describes which type(s) of contributions the paper will make
 - 5th paragraph: Outline of the paper



Outline for Research Papers

- **2. Related work / Background**
 - In this section you detail what is the current state of knowledge when it comes to Area of concern and Problem
 - 2.1 - Area of concern + Problem
 - 2.2 - Framework
- **3. Method**
 - 3.1 - Research setting
 - 3.2 - Research process
 - 3.3 - Data collection
 - 3.4 - Data analysis
 - 3.5 - Limitations / Validity Threats
- **4. Results / Data**
 - Note: It is your Data Analysis that you include here, not your full collected data.



Outline for Research Papers

- **5. Discussion**

- Applies your Framework to your Data Analysis
- 5.x - Subsections named based on your Framework that you are using (from section 2)
- 5.y - Always end your discussion with a summary

- **6. Conclusions**

- Important: this section should **NOT** include anything that is new to the paper!
- A summary of the study and the main conclusions
- Should be written more 'stand-alone'

- **7. Acknowledgements**

- Thank those that made particular contributions or funded the study etc.

- **References**

- Only high-quality and complete references
- Generally avoid web references or material that has not been through scientific peer review



How to write the Abstract

- **Context:**

- Throughout an organisation, people have different responsibilities and worktasks, hence, it is probable that different roles have different priorities when it comes to what should be improved within a company. This has been found in previous studies in marketing, but is this true for software improvement as well?

- **Objective:**

- This paper evaluates how different roles in a software development organization view different issues in software process improvement and if such differences could be used in order to provide more tailor-made process improvements within an organization and uses this as a working hypothesis.

- **Method:**

- A quantitative questionnaire containing five different weighted questions related to software process improvement was developed. 84 employees from all levels of a Swedish telecommunication company were then approached, of which 63 responded.



How to write the Abstract

- **Results:**

- The different roles disagreed in three of the questions while they agreed in two of the questions. The disagreement was related to issues about importance of improvement, urgency of problems, and threat against successful process management, while the questions where the roles agreed focused on communication of the processes (documentation and teaching).

- **Conclusions:**

- It is concluded that it is important to be aware and take into account the different needs of different roles. This will make it possible to provide improvements tailored to specific roles which will probably help to overcome resistance to process improvements. It is also important to look into other areas and companies (for example, marketing) where it could be beneficial when conducting process improvements.



Example: Abstract in RE

Abstract

[Context and motivation] Requirements Engineering is perceived as a tremendously difficult activity. Practitioners usually have no clue how to do it and researchers even less. **[Question/problem]** In this paper, we aim at providing a cost-effective Requirements Engineering method directly applicable by anyone to any kind of system. **[Principal ideas/results]** We thought about it for a while and finally came up with a pretty simple two-step method: (1) find the requirements, (2) implement the system according to the requirements. **[Contribution]** At the moment, we have described the method and applied it to a project, but it did not work out that well. We are trying to investigate the causes.



How to write the Discussion

What to include

- State the major findings
- Explain the meaning of the findings and why the findings are important
- Relate the findings to those of similar studies
- Consider alternative explanations of the findings
- (State the clinical relevance of the findings)
- Acknowledge the study's limitations
- Make suggestions for further research (conclusions)

What to avoid

- Overinterpretation of the results
- Unwarranted speculations
- Inflating the importance of the findings
- Tangential issues
- Conclusions that are not supported by the data
- Inclusion of the 'take-home message'; save this for the conclusions section



References

Peer-reviewed /scientific

- Journals
- Conferences
- Workshops
- Posters
- Short papers

-> Reliable and trustworthy

Other sources

- Books (e.g. course books)
- Material for journalists
- Industry conferences
- White papers
- Web pages (including Wikipedia)

->no guarantee for trustworthiness



References

- Requirements Engineering journal
 - Negotiation research spans many disciplines [3].
 - This result was later contradicted by Becker and Seligman [5].
 - This effect has been widely studied [1-3, 7]
- Alternative
 - Blom et al. (2005) states... / Blom et al. [3] states...
 - ...this result (Blom et al. 2005) / ...this result [3]



References

- In the list of references
 - **Book:** Author(s) year of publication, title (edition) publisher (geographical location of publication)
 - **Journal papers:** Author(s) year of publication, title, name of the journal, volume, issue/number, pages
 - **Conference papers:** Author(s) year of publication, title, name of the conference, geographical location and date for the conference, pages
 - **Technical report:** Author(s), year of publication, title, report number, publishing institution
 - **Information from internet:** Author(s) or publishing institution, year of publication, (title), date for last access, URL



A good research paper

- **What, precisely, was your contribution?**
 - What question did you answer?
 - Why should the reader care?
 - What larger question does this address?
- **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? What do you provide a superior alternative to?
 - How is your result different from and better than this prior work?
 - What, precisely and in detail, is your new result?
- **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?



Be clear about your claim...

Awful	▼	• I completely and generally solved ... (unless you actually did!)
Bad	▼	• I worked on galumphing. (or studied, investigated, sought, explored)
Poor	▼	• I worked on improving galumphing. (or contributed to, participated in, helped with)
Good	▲	• 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	▲	• 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.

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.

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



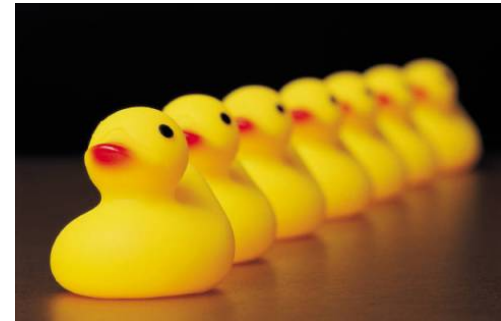
Consistent names

- Give it a name – Do you reader a favor and give your language, your system, your algorithm a name
- When you are talking about an idea, always use the same word of phrase
- When you are talking about different ideas, never use the same word



Structure of a section

- What is the purpose of this paragraph?
- How well does it fulfill its purpose?





Cutting

- Papers are limited to a fixed number of pages
- Sometimes necessary to write a longer paper and then cut
- If the section does multiple jobs, perhaps one or more of those jobs can be eliminated.
- Perhaps the section does only one job, or perhaps each of the jobs it does is essential.
 - assign a relative value of each paragraph



Principles

0. *Correctness.* Write correct English, but know that you have more latitude than your high-school English teachers may have given you.
- ★1. *Consistent names.* Refer to each significant character (algorithm, concept, language) using the same word everywhere. Give a significant new character a proper name.
- ★2. *Singular.* To distinguish one-to-one relationships from *n-to-m* relationships, refer to each item in the singular, not the plural.
- ★3. *Subjects and verbs.* Put your important characters in subjects, and join each subject to a verb that expresses a significant action.
- ★4. *Information flow.* In each sentence, move your reader from familiar information to new information.
5. *Emphasis.* For material you want to carry weight or be remembered, use the end of a sentence.
- ★6. *Coherence.* In a coherent passage, choose subjects that refer to a consistent set of related concepts.
- ★7. *Parallel structure.* Order your text so your reader can easily see how related concepts are different and how they are similar.
8. *Abstract.* In an abstract, don't enumerate a list of topics covered; instead, convey the essential information found in your paper.

Practices

- ★1. *Write in brief daily sessions.* Ignore the common myth that successful writing requires large, uninterrupted blocks of time—instead, practice writing in brief, daily sessions.
2. *Focus on the process, not the product.* Don't worry about the size or quality of your *output*; instead, reward yourself for the consistency and regularity of your *input*.
3. *Prewrite.* Don't be afraid to think before you write, or even jot down notes, diagrams, and so on.
4. *Use index cards.* Use them to plan a draft or to organize or reorganize a large unit like a section or chapter.
- ★5. *Write a Shitty First Draft™.* Value a first draft not because it's great but because it's there.
6. *Don't worry about page limits.* Write the paper you want, then cut it down to size.
7. *Cut.* Plan a revision session in which your only goal is to cut.



To do ...

- Assignments 2 and 3 are due Monday February 23, 8.00am
- Attend Monday's lecture about SLR/SM/LR
- **Dan M. Berry's smart tips to avoid wasting space**
 - <http://refsq.org/2014/dan-m-berrys-smart-tips-to-avoid-wasting-space/>