
How to Conduct Scientific Research

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Agenda

- Research methods in computer science
- Research plan
- How to find related literature?
- Scientific writing
- How to submit a paper to a conference?

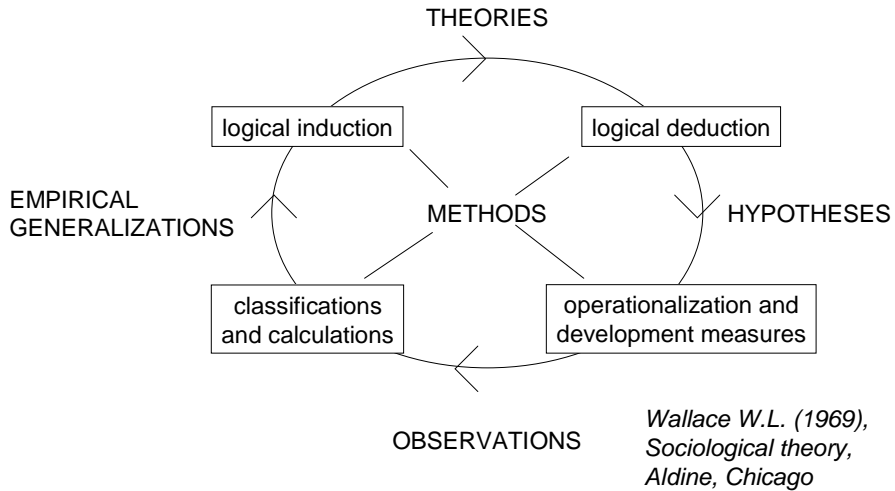
Research methods

- Jenkins' model on research process
- Wallace's Model
- Taxonomy of research methods

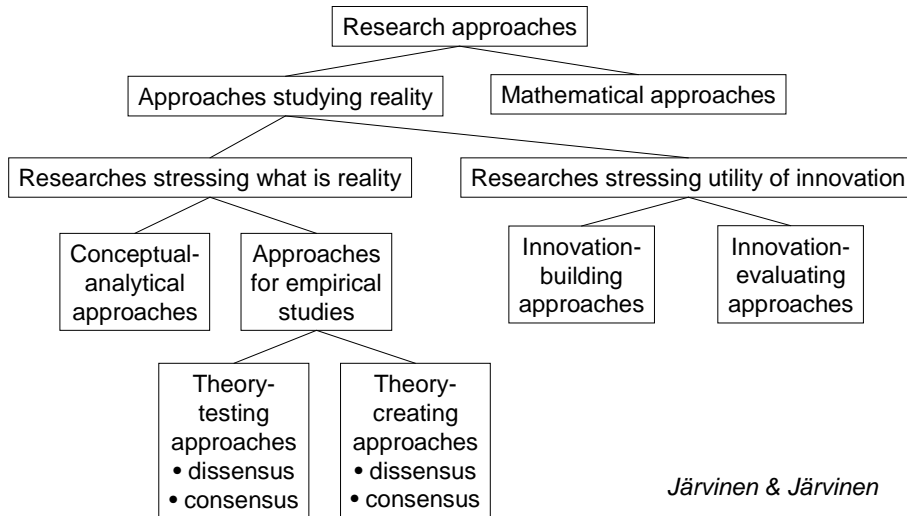
Jenkins' Model on Research Process

1. Idea
2. Library research
3. Research topic
4. Research strategy
5. Experiment design
6. Data capture
7. Data analysis
8. Publish results

Wallace's Model



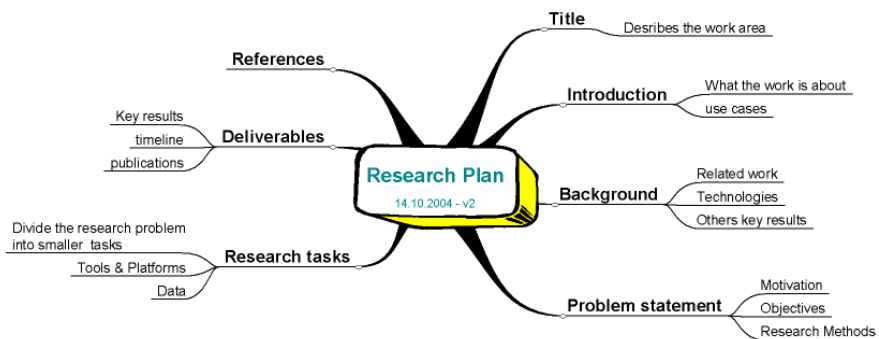
Taxonomy of Research Methods



More Information

- Pertti Järvinen: On Research Methods
 - Opinpajan kirja
Tampere, Finland
 - ISBN 952-99233-1-7
 - <http://granum.uta.fi>

Research Plan



How to Find Related Literature?

- The ACM Portal
 - <http://portal.acm.org/>
- Kluwer Online
 - <http://www.kluweronline.com/>
- IEEExplore
 - <http://ieeexplore.ieee.org/>
- CrossRef
 - <http://www.crossref.org/>

Scientific Writing

- IMRAD formula
- Different parts of paper

IMRAD

- Introduction
- Methods
- Results
- and Discussion

Title

- Title is a label - not sentence
- Fewest possible words that adequately describe the contents of the paper
- Indexing and abstracting services depend heavily on the accuracy of the title
- Avoid abbreviations

Authors

- Alphabetical order or order of importance
- Persons who actively contributed to the overall design and execution of the experiments
- First name, middle initial, last name
- Address of the institution where the work was done
- Addresses in the same order as authors

Abstract

- Mini version of the paper
 - Brief summary of each of the sections
- Abstract should not exceed 250 words
- Abstract should
 - State the principal objectives and scope of the investigation
 - Describe the methodology employed
 - Summarize the results
 - State the principal conclusions

Introduction

- Enough background information so that reader can understand results
- Reader should not need to refer to previous publications on the topic
- Introduction should describe
 - Nature and scope of the problem investigated
 - Review of related literature
 - Method of the investigation
 - Principal results
 - Principal conclusions

Methods

- Describe the experimental design
- Provide enough detail so that others can repeat the experiment
- Use past tense

Results

- Overall description of experiment
- Present the data
- Results are presented in past tense
- Avoid redundancy

Discussion (I/II)

- Try to present principles, relationships, and generalizations shown by the results
- Point out any exceptions or any lack of correlation and define unsettled points
- Show how your results and interpretations agree with previously published work

Discussion (II/II)

- Don't be shy; discuss theoretical implication of your work as well as practical applications
- State your conclusions as clearly as possible
- Summarize your evidence for each conclusion

Acknowledgement

- Acknowledge any significant technical help, etc.
- Acknowledge any outside financial assistance
- Grants, contracts, or fellowships

References

- List only significant, published references
- Check all parts of every reference againsts the original copy the publications
- Reference styles
 - <http://www.computer.org/author/style/refer.htm>
 - <http://www.apastyle.org/>
 - <http://www.acm.org/pubs/submissions/submission.htm>

How to Submit a Paper to a Conference?

- Conferences
- Call for papers
- Review
- Check list
- Submission
- Reviewers' comments
- Final version
- Before, at, and after conference

Conferences

- Personal web pages
 - <http://www.tml.hut.fi/~pv/conferences.html>
- Public databases
 - <http://www.papersinvited.com/>
- Organizations
 - <http://webapps1.ieee.org/conferenceSearch/search.do>
 - <http://campus.acm.org/calendar/>
- SIGs
 - http://www.sigmm.org/Events/events_page

Call for Papers

- Title
- Location
- Date
- Deadline
- Topics of Interest
- Instructions for Authors

Review

- Originality
- Contribution
- Structure
- Quality of Language
- References

Check List

- Related Work
- Experiments
- Results
- Conclusions
- Abstract

Submission (I/II)

- Before submission ask comments from your colleagues and supervisor
- When the paper is ready, prepare it according to the Instructions for Authors
 - Layout
 - Format
 - Number of pages
 - Word count
 - Figures

Submission (II/II)

- Most conferences have electronic submission
 - web page
 - Email
- Otherwise you have to submit the paper either using normal or courier mail
- Make sure that you get an acknowledgement from the submission
- If you are TML staff, enter the publication in the internal publications database

Reviewers' Comments (I/II)

- Usually, conferences announce beforehand when the review results should be ready
- The results are usually emailed to all authors
- Read the results carefully
- Remember that good conferences accept less than half of the papers
 - Acceptance ratio can be even below 20%

Reviewers' Comments (II/II)

- If the paper is not accepted, consider improving it according to the comments and submitting it to another conference
- Usually, it pays off to cool down for couple of days or even weeks

Final Version

- Make the corrections suggested by the reviewers
- Follow the instructions given to the authors
- Often, the final layout is different than the review version
- Send the final version to the conference well before the deadline

Before Conference (I/II)

- Arrange travel funding
 - Your employer
 - Graduate Schools
 - Apply for grants
 - Tax reduction
- Write travel proposal
- Register to the conference
 - Most conferences publish only papers, which author has registered to the conference

Before Conference (II/II)

- Book flight tickets etc.
- Make hotel reservation
- Prepare your presentation
 - Oral presentation
 - Poster
- Practice your presentation
- It is a good idea to make safe copies of your paper and presentation and upload them, e.g., to your web page

In conference

- Go to see interesting presentations
 - Find the interesting presentations before the conference
- Look also presentations outside your own area of interest
- Meet people
- Give your own presentation
- Promote your own work

After Conference

- If you are TML staff, enter the publication to the TKK publication database
- Write travel bill
- Tell about what you learned in the conference to you colleagues