ACADEMIC WRITING & PEER REVIEW PROCESS

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COURSE LEARNING OBJECTIVES

- The student is able to:
  - Independently find literature on a specific research topic and conduct systematic literature review
  - Identify qualitative and quantitative research approach and choose between them appropriately
  - Explain qualitative data collection and data analysis approaches
  - Explain quantitative data collection and data analysis approaches
  - Demonstrate ethical approach and research integrity in their own research
  - Identify common threats to quality of research and describe the validity and reliability of their own research
  - Present, both orally and in writing, the research process for a specific research topic, findings, and conclusion in a coherent and concise manner.
  - Write a scientific report covering a specific research topic using academic writing format and required content.

AGENDA

- Academic writing
  - Components of a research report
  - General tips
- Peer review
- Project presentation and peer assessment

DISCLAIMER

- This is not an English class.
- Detailed grammatical aspects and mechanics of writing are not covered here.

WHY? WHAT IS IN IT FOR ME?

- You need to be able to communicate (in text) suitably within the context, i.e. academic (for master thesis).
- Your project is only as good as how you communicate it.
- If you do not write according to the academic convention, the reader will focus more on how you write than what you write.

Example:

- “We read a bunch of papers and talked to like 11 different people who work in industry, from that we made a checklist”
- “The checklist was developed from a literature review and interviews with 11 industry practitioners.”

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- Your projec nicate it.
- If you do n onvention, the reader will hat you write.
  - "The checklist was developed from a literature review and interviews with 11 industry practitioners."
  - "We read a bunch of papers and talked to like 11 different people who work in industry, from that we made a checklist"

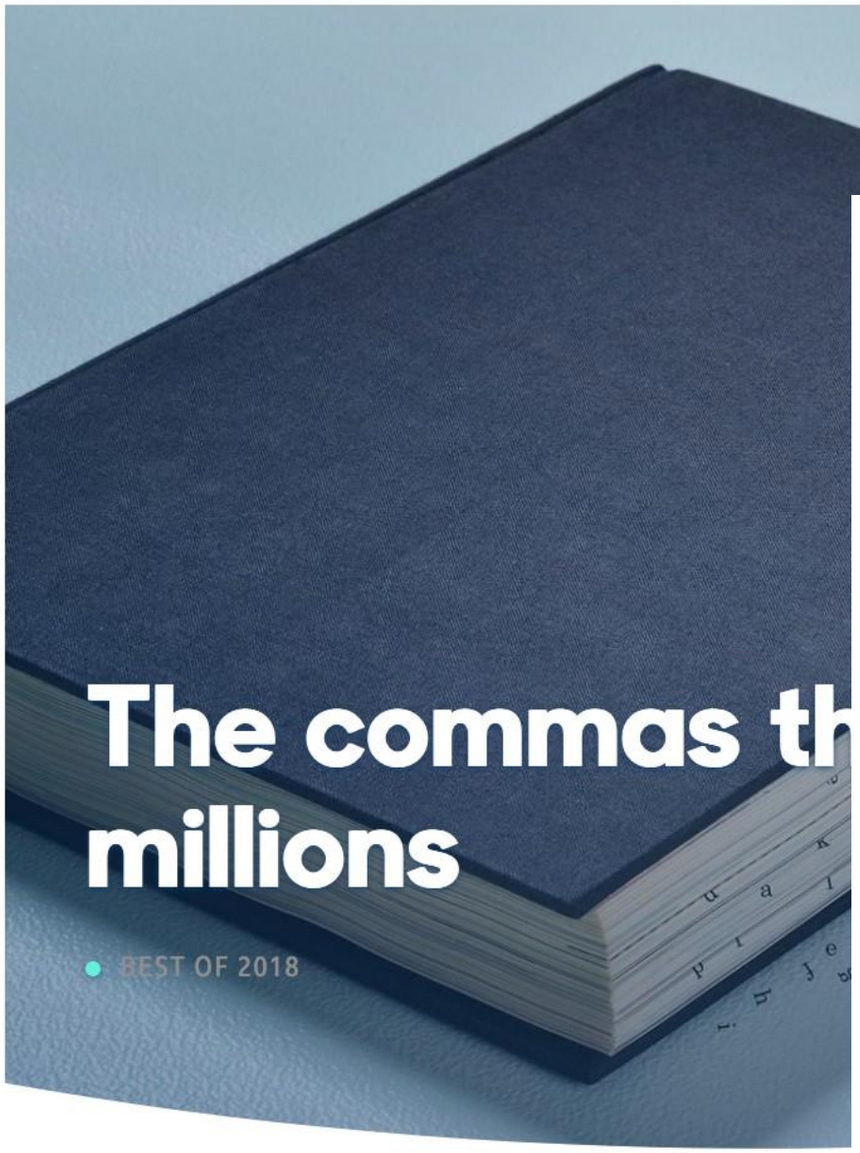
THE SAME APPLIES IN INDUSTRY!

The commas that cost companies millions

BEST OF 2018

By Chris Stokel-Walker
23rd July 2018

For most people, a stray comma isn't the end of the world. But in some cases, the exact placement of a punctuation mark can cost huge sums of money.



By Chris Stokel-Walker
23rd July 2018

A dairy company in the US city of Portland, Maine settled a court case for $5m earlier this year because of a missing comma.

Three lorry drivers for Oakhurst Dairy claimed that they were owed years of unpaid overtime wages, all because of the way commas were used in legislation governing overtime payments.

The state's laws declared that overtime wasn't due for workers involved in "*the canning, processing, preserving, freezing, drying, marketing, storing, packing for shipment or distribution of: 1) agricultural produce; 2) meat and fish products; and 3) perishable foods*".

The drivers managed to successfully argue that because there was no comma after "shipment" and before "or distribution", they were owed overtime pay. If a comma had been there, the law would have explicitly ruled out those who distribute perishable foods.

https://www.bbc.com/worklife/article/20180723-the-commas-that-cost-companies-millions

COMPONENTS OF A RESEARCH REPORT

COMPONENTS OF A RESEARCH PAPER OR REPORT
IEEE Format: 6-10 pages

- Title
- Abstract
- Introduction
- Background/ Related Work
- Research Methodology
- Results
- Discussion
- Conclusion
- Appendices

TITLE

TITLE

- Should capture the main topic, its importance, attractive and concise.

Principles of Survey Research
Part 1: Turning Lemons into Lemonade

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TITLE

- If possible <=12 words
- **Declarative:** State the main results
  - “Effective knowledge sharing increases project success”
- **Descriptive:** The subject but no results
  - “The effects of knowledge sharing in Agile projects: An experiment”
- **Interrogative:** Subject in form of a question
  - “Does knowledge sharing improve performance in Agile projects?”

ABSTRACT

ABSTRACT

- Should indicate what your paper is about from the topic, motivation, aim, methodology, results, and conclusion.
- All in 200-250 words.
- Two kinds:
  - Unstructured
  - Structured

ACADEMIC WRITING

UNSTRUCTURED ABSTRACT

***Abstract*—Solving multi-objective multi-issue negotiation problems involving interdependent issues distributed among multiple control domains is inherent to most non-trivial cyber-physical systems. In these systems, the coordinated operation of interconnected subsystems performing autonomous control is essential to achieve overall system goals. In spite of its importance, the area has received limited attention to date. In this paper, we propose an innovative agent-based coordination approach for coordinating and controlling interconnected subsystems in cyber-physical systems with interdependent issues. The proposed approach can solve negotiation problems with interdependent issues across multiple coupled control domains. We demonstrate our approach by solving a coordination problem where a Combined Heat and Power Plant must allocate electricity for three commercial greenhouses to ensure the required plant yield. Our results show, that our approach is able to balance the individual requirements of multiple coupled control domains and thereby achieve a global equilibrium state for energy allocation and demand.**

Topic/Context

Motivation

Methodology/ Approach

Results

Aisha Umair, Anders Clausen, and Bo Nørregaard Jørgensen. "An agent-based negotiation approach for balancing multiple coupled control domains." 2015 IEEE PES Innovative Smart Grid Technologies Latin America (ISGT LATAM). IEEE, 2015.

STRUCTURED ABSTRACT

Context: Agile maturity models (AMMs) suggest that agile practices are introduced in a certain order. However, whether the order of agile practice introduction as suggested in the AMMs is relevant in industry has not been evaluated in an empirical study.

Objectives: In this study, we want to investigate: (1) order of agile practice introduction mentioned in AMMs, (2) order of introducing agile practices in industry, and (3) similarities and differences between (1) and (2).

Methods: We conducted a literature survey to identify strategies proposed by the AMMs. We then compared the AMMs' suggestions to the strategies used by practitioners, which we elicited from a survey and a series of interviews from an earlier study.

Results: The literature survey revealed 12 AMMs which provide explicit mappings of agile practices to maturity levels. These mappings showed little agreement on when practices should be introduced. Comparison of the AMMs' suggestions and the empirical study revealed that the guidance suggested by AMMs are not aligned with industry practice.

Conclusion: Currently, AMMs do not provide sufficient information to guide agile adoption in industry. Our results suggest that there might be no universal strategy for agile adoption that works better than others.

Nurdiani, I., Börstler, J., Fricker, S., Petersen, K., Chatzipetrou, P.Understanding the order of agile practice introduction: Comparing agile maturity models and practitioners' experience. Journal of Systems and Software(156), October, 2019.

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STRUCTURED ABSTRACT ENSURES COMPLETENESS AND UNDERSTANDABILITY. IN SOME CASES, IS MANDATORY TO USE.

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INTRODUCTION

INTRODUCTION

- An extended version of the abstract
- Needs to introduce the topic and why this topic is interesting or relevant
- Describe the research questions.
- Highlight your contribution; point out the most important aspects of your results
- Outline the rest of the report.

EXAMPLE

Research Question

Contribution

global goals, while respecting their individual goals. To this end, this paper seeks to address the following research question, "How can we coordinate the demand and allocation of shared resources in SoCPSs to engineer an emergent behavior that meets the performance requirements of the SoCPSs' objectives, while complying with the performance requirements of the individual CCPS".

The main contributions of this work are, 1) a meta-model which describes a SoCPSs design concept as well as the design of its CCPSs, 2) an intra-constituent agent (intra-CA) optimization model, which handles internal decision making process of each CCPS, and maintains its autonomous behavior, 3) an inter-constituent agent (inter-CA) negotiation model, which facilitates the interaction between CCPSs in order to coordinate interdependent actions belonging to different CCPSs, 4) a conflict resolution method for solving conflicts between goals of CCPSs.

The remainder of this paper is organized as follows. Related work section provides an overview and evaluation of literature. Proposed approach section describes the approach to address the research problem. Case study section presents a case study for the experiments. Experiments section presents experiments and results to validate the proposed approach. Finally, the conclusion section draws conclusion about the presented research.

Paper Outline

BACKGROUND/ RELATED WORK

BACKGROUND/ RELATED WORK

- Sometimes there is not much relevant related work, so you write a background instead to motivate why you do and what you do.
- The content should include a summary of relevant previous research on the topic.
- Highlight the results and the source.
- Highlight the gap of previous research.

Related work

The stated research problem spans multiple research areas. As a consequence, several areas, i.e., SoS coordination, cooperative coordination and control, and MOMI negotiation strategies are taken into consideration from the existing literature.

The SoS coordination strategies cover the methods for coordinating the CSs of an SoS in order to meet SoS mission. The authors in (Fang and DeLaurentis 2015) proposed a coordination approach based on approximate dynamic programming and transfer contract mechanism to facilitate hierarchy of stakeholders to reach an agreement with conflicting interests and budget constraints. The approach tries to avoid budget violations but stakeholders might end up in a situation where budget requests violate budget constraints. The authors in (Barnes II et al. 2017) presents classification and analysis of coordination strategies (centralized, hierarchical, peer and decentralized) for coordinating CSs in an SoS. None of the coordination strategies account for the fact that each CS may have internal conflicting objectives negotiating over several decision variables. A price-based coordination of constrained SoS is proposed in (Wenzel et al. 2017), where a chemical production site comprises multiple autonomous production plants. The price and resource utilization vectors are exchanged among centralized coordinator and production plants to coordinate shared resources.

Summary of relevant research

Gap of previous research

Cooperative coordination and control strategies are used to solve cooperative control problems, where the individuals in the group share a common goal and act according to the mutual interest of the group (Beard et al. 2006). These approaches can be roughly classified as leader-follower approaches and leaderless approaches. In leader-follower approach (Pasqualetti et al. 2008; Sugar and Kumar 1998), the leader pursues the group objective and followers are supposed to follow their leader. The approach compromises over autonomy and does not consider cases where followers' objectives may be in conflict with each other or with the group objective. In leaderless approaches (Khazaei and Nguyen 2017; Ren et al. 2005), the agents try to achieve the group objective without any leader and cooperate through a coordination variable, which is the minimal amount of information to be shared among members of the group.

Gap of previous research

BACKGROUND/ RELATED WORK

- In this course, it does not matter what you call it; background or related work.
- You need to show that you are familiar with relevant work in the topic of your project.

RESEARCH METHODOLOGY

RESEARCH METHODOLOGY

- Tell the reader how you did your project.
- Describe the methodology used to answer the research questions.
- Describe in detail the methodology used in data collection, survey design, experiment design, etc.
- Describe in detail the method used for data analysis
  - Statistical methods, coding procedures, etc.

Systematic Literature Review: Research Method

- The recommended subsections could be, but not limited to:

A. Search Process

B. Inclusion/Exclusion Process

C. Data Extraction Process

D. Data Quality Assessment

E. Data Synthesis

Systematic Mapping: Research Method

- The recommended subsections could be but not limited to

A. Search Process

B. Inclusion/Exclusion Process

C. Classification/Categorization

D. Data Extraction Process

E. Data Synthesis

Experiment: Research Method

- The recommended subsections could be but not limited to

A. Scoping & Context

B. Hypothesis Formulation

C. Variable Selection

D. Experiment Design

E. Data Analysis

Quantitative/Qualitative: Research Method

- The recommended subsections could be but not limited to

A. Target Audience and Sampling

B. Survey Design

C. Data Collection

D. Data Analysis

Secondary Data Analysis: Research Method

- The recommended subsections could be but not limited to

A. Data Collection *//Locate and collect your data*

B. Data Evaluation *// to see if it is suitable for your needs.*

C. Data Preparation

RESULTS

RESULTS

- Objective representation of your project results.
  - Answers to your research questions.
  - No interpretation (done in discussion section).
- Ideally, the subsections are aligned with the research questions.
- Or, the subsections should be organised according to the main findings from your project.
- Do not mix up results with methodology:
  - Not good presentation: Based on the data collected from the survey that we conducted with industry practitioners distributed on LinkedIn, 75% of them indicates that they do not practice TDD.
  - Instead: Our survey suggests that 75% of our respondents do not practice TDD.

DISCUSSION

DISCUSSION

- Interpretation of your results.
- Use the following questions to formulate your discussion (*paraphrased from Karolinska Institutet's Academic Writing Guide*):
  - What do your results mean?
  - How do they relate to previous research? What are the reasons for potential differences between your study and previous research? What do potential similarities indicate?
  - What are the strengths and weaknesses (validity threats) of the study? How do they affect your results?
  - What are the implications of your study to industry practitioners AND/ OR other researchers?
    - What can other researchers do with the results of your project?
    - What benefits can industry practitioners gain from the results of your project?

Karolinska Institutet: https://kib.ki.se/en/write-cite/academic-writing

CONCLUSION

CONCLUSION

- Contains summary of the whole work
- Remind the reader of the solution you proposed
- Revisit the research question and reflect what your results may imply.
- Suggests a direction for future research.

GENERAL TIPS

USING SOURCES (KAROLINSKA INSTITUTET)

- When referring to other people's work, you need to acknowledge and do it appropriately (to avoid academic misconduct).

- Different ways:
  - Quote
  - Paraphrase
  - Summarise

QUOTE (KAROLINSKA INSTITUTET)

- Take a statement from another source (paper, books, etc), verbatim.
- It is important that you use “ ” marks, when taking someone else’s statement.
- Generally not recommended. Only use it when you are referring to a definition or taking a statement from a prominent source.

Karolinska Institutet: https://kib.ki.se/en/write-cite/academic-writing

EXAMPLE: QUOTE (KAROLINSKA INSTITUTET)

- A definition

  According to IEEE Standard 610.12-1990, flexibility is *“the ease with which a system or component can be modified for use in applications or environments other than those for which it was specifically designed”*

Karolinska Institutet: https://kib.ki.se/en/write-cite/academic-writing

EXAMPLE: QUOTE (KAROLINSKA INSTITUTET)

- Taking a statement from a very prominent source.
  - Lehman's law of software entropy: *"(1) A computer program that is used will be modified, (2) When a program is modified, its complexity will increase, provided that one does not actively work against this."*

Karolinska Institutet: https://kib.ki.se/en/write-cite/academic-writing

PARAPHRASE (KAROLINSKA INSTITUTET)

- Take a statement from another source (paper, books, etc), but using your own word to express it.
- Example:
  - Original (source: Dybå and Dingsøyr, 2008): “We identified a number of reported benefits and limitations of agile development within each of these themes. However, the strength of evidence is very low, which makes it difficult to offer specific advice to industry.”
  - Paraphrased: “However, the strength of empirical evidence regarding the benefits of Agile software development is still very low (Dybå and Dingsøyr, 2008).”

Karolinska Institutet: https://kib.ki.se/en/write-cite/academic-writing

Dybå, T. , Dingsøyr, T. , 2008. Empirical studies of agile software development: a systematic review. Inf. Softw. Technol. 50 (91), 833–859

SUMMARISE (KAROLINSKA INSTITUTET)

- Provide an overview of what the original text says without going into too much detail.
- Appropriate for background/ related work section.
- Example:

> Murphy et al. conducted five annual surveys within Microsoft and reported that practices like code reviews, metaphors, and retrospective are increasing in their use (Murphy et al., 2013). Meanwhile, practices like unit testing, TDD and pair programming are decreasing in their use.

Karolinska Institutet: https://kib.ki.se/en/write-cite/academic-writing

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CITATIONS AND REFERENCES

- When using a statement from external source you need to add a citation.

Why?

CITATIONS AND REFERENCES

- Why?
  - Acknowledge or credit the original author
  - Reader can refer back to original source
  - Adds credibility to you, because you demonstrate your familiarity to the topic

WHEN CITING IN THE TEXT

- In this course we use IEEE template.
- It is numerical in square brackets, i.e., [1].
- You can use it in the beginning or end of a sentence.
  - According to Somebody [3], …..
  - It is generally regarded that, ….[4,7].

REFERENCES

- Ideally, you should minimise:
  - Online sources, e.g., wikipedia, blogs, podcasts, etc.
  - Non-peer reviewed sources: books, technical report.
- Should try to include the most recent publications.

COLLOQUIALISM

- Research papers or any academic reports, should be written in formal form.
- Avoid slangs.
- Do not use contraction
  - We didn’t (contracted), instead write: We did not

ABBREVIATION

- The first time you refer to an abbreviation in a text, you need to spell it out.
  - Learning Management Systems (LMS)….
- You can reintroduce it in later section if you have a long report or have many abbreviations in the text.

PEER REVIEW

WHAT IS PEER REVIEW?

- A process to validate academic work with independent and un-biased perspective.
- It is done to improve the quality of published research.

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INDUSTRY ALSO HAVE AN EQUIVALENT PEER-REVIEW PROCESS: SOURCE CODE REVIEW, QA & TESTING, etc...

WHAT IS THE BENEFIT FOR THE REVIEWER?

WHAT IS THE BENEFIT FOR THE REVIEWER?

- A retrospective on one's way of presenting one's research.
- A first look on cutting edge, new research that only 2-3 other people may have seen.
- A way to get inspired (not plagiarise) from new research.

PROJECT PRESENTATION & PEER REVIEW

PROJECT SUBMISSION AND PRESENTATION

- Report draft is due on 23rd November 2022

- You need to submit the draft report on **ITSLEARNING** and email the draft to assessing group members who are evaluating your report.

- On the presentation day, you have 15 minutes to present your project and 5 minutes Q&A.

- The Q&A will be driven by the assessing group that is evaluating the report.

- Presentation and review must be done physically

PEER REVIEW

- The reviewing group must read the report, suggest improvements, and ask for clarification from the presenting group on the presentation day.
- Doing the peer-review is mandatory.
- Be constructive. Do it in a way that would help your colleagues to succeed.
- Use the rubric to help you form constructive feedback.

Presenting Group	Assessing Group
1	8
2	9
3	4
4	2
5	15
6	10
7	11
8	5
9	7
10	1
11	3
12	14
13	6
14	13
15	12

THE PRESENTING GROUP MUST UPLOAD THEIR DRAFT ON ITSLEARNING AND SEND THEIR REPORTS TO THE ASSESSING GROUP

THE ASSESSING GROUP MUST READ AND ASSESS THE REPORT FROM PRESENTING GROUP USING RUBRIC

NEXT WEEK

- No lecture
- Available on email (aiu@mmmi.sdu.dk)
- Please send an email in case of any question

GOOD LUCK