Photo by Lukas from Pexels

IT3010

Empirical research methodologies in IT and digitalization

Introduction

January 11, 2022

Babak Farshchian

NTNU

Please download the handouts from Blackboard!

Agenda

- 1: Introduction to empirical research.
- 2- Researching everyday problems.
- 3- Research design: Central concepts.
- (Break 15 minutes)
- 4- Basic research design example.
- 5- A research design framework.
- 6- Course organization.
- 7- Questions.

Course staff

- **Course coordinator**: Babak Farshchian

- **Course staff**:
  - Babak Farshchian.
  - Tangni Cunningham Dahl-Jørgensen.
  - Hamid Mehmood.
  - Nora Othilie Ringdal.

How would you define empirical research?

- Go to menti.com
- Use code 36 96 21 13

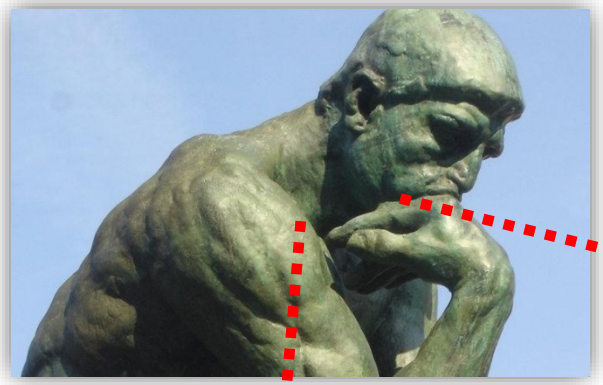
What is research?

"Research is the creation of new knowledge, using an appropriate process, to the satisfaction of the users of the research" – Oates, p. 7

- Some central keywords:

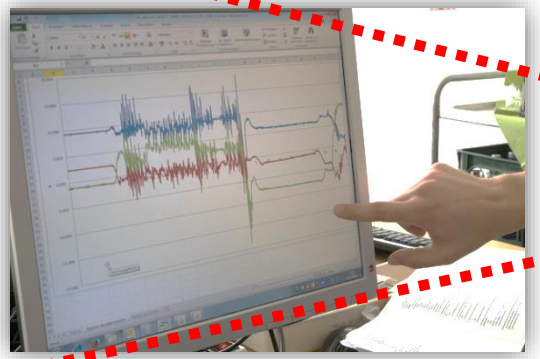
  practical problems, research problems, research methods, research proposals, data collection, theories, hypotheses, answers, ethics, papers, dissemination, peer review,….

Rigor and Relevance



You

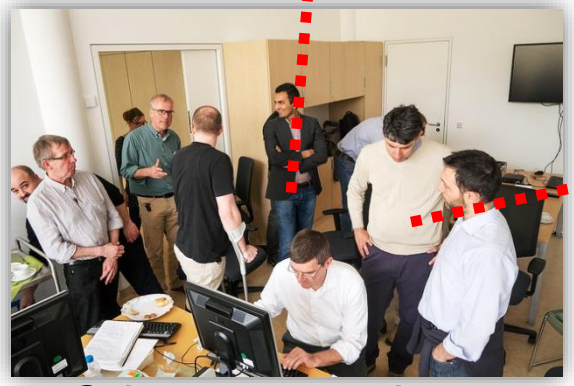
Relevance



Your research

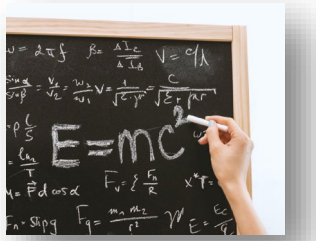
Practice

Rigor



Other researchers

Rigor and Relevance (rough guide)



Theoretical research

Basic research

Applied research

Conspiracy theories

Rigor

(Perceived) Relevance

Why research methods?

- Transparency and rigor
- Important to enable systematic criticism
- Understanding the research of others
- Using research results more effectively

- Being critical about what pretends to be research

- Being able to distinguish research from quasi-research, or mere bullshit.

Researching everyday problems

- Problem description:
  - Because of the pandemic most employees in company X now work from home. Your boss asks you to find/buy/build a new social media tool for the employees to stay connected and socialize.
- Task:
  - Create a short plan for how you would use empirical research to address this problem.
- Process:
  - Spend 5 minutes to think about your plan and sketch it for yourself on a piece of paper.
  - Spend 3 minutes to write it down in your computer in form of steps.
  - Keep this description for yourself (and review it at the end of the course).
  - ...or you can post it to Padlet (link in chat window) anonymously. We will upload all the shared plans after the lecture.
  - You can use both Norwegian and English to write your plan.

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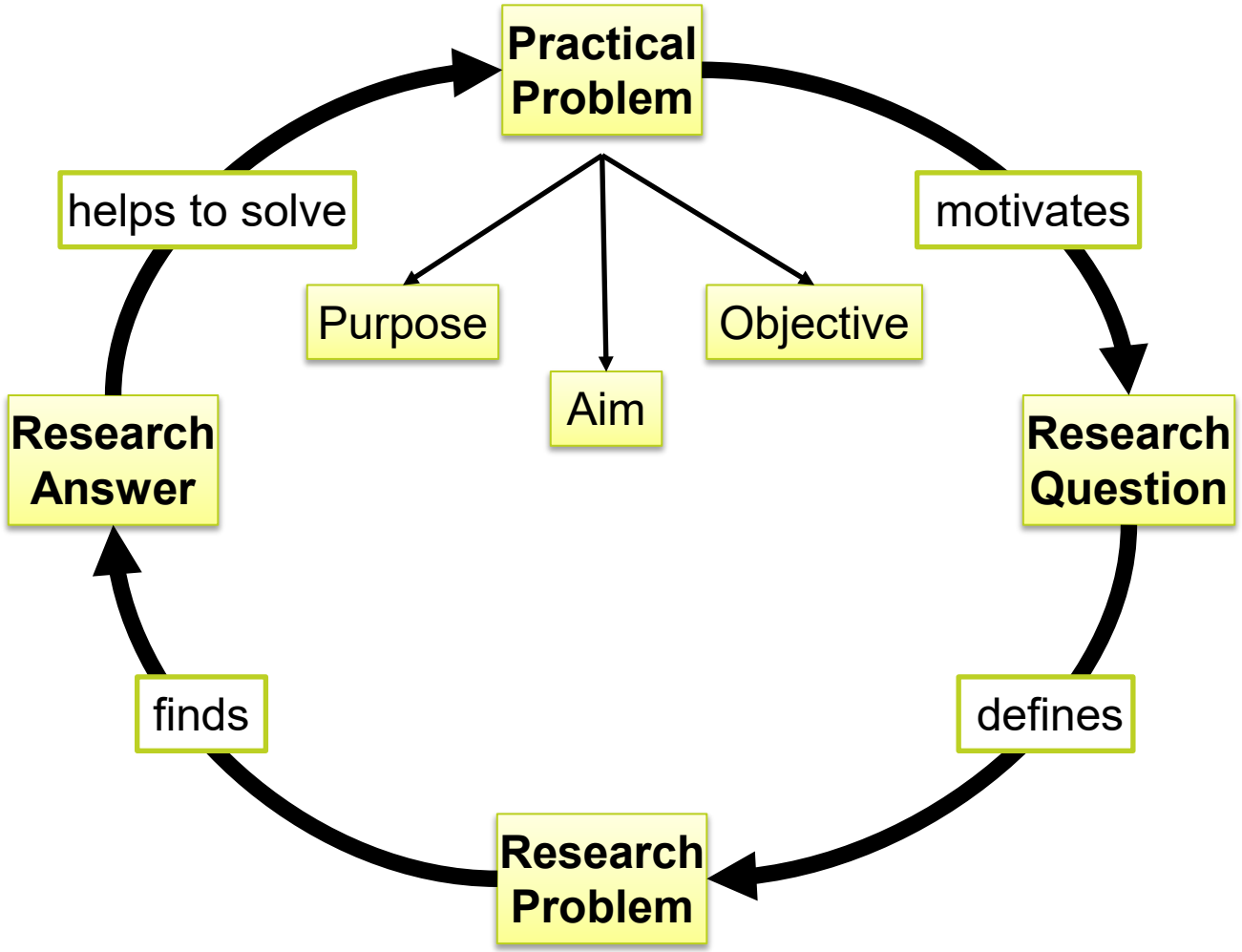
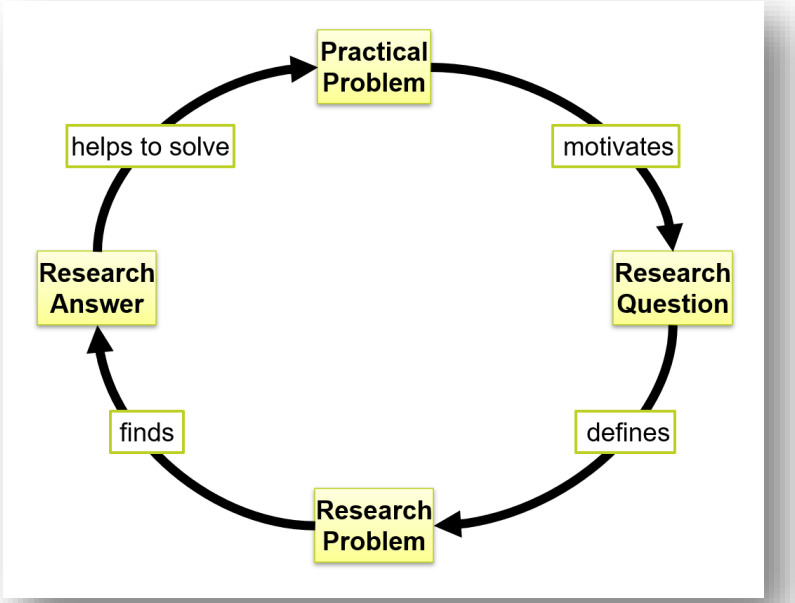
Research design: Central concepts



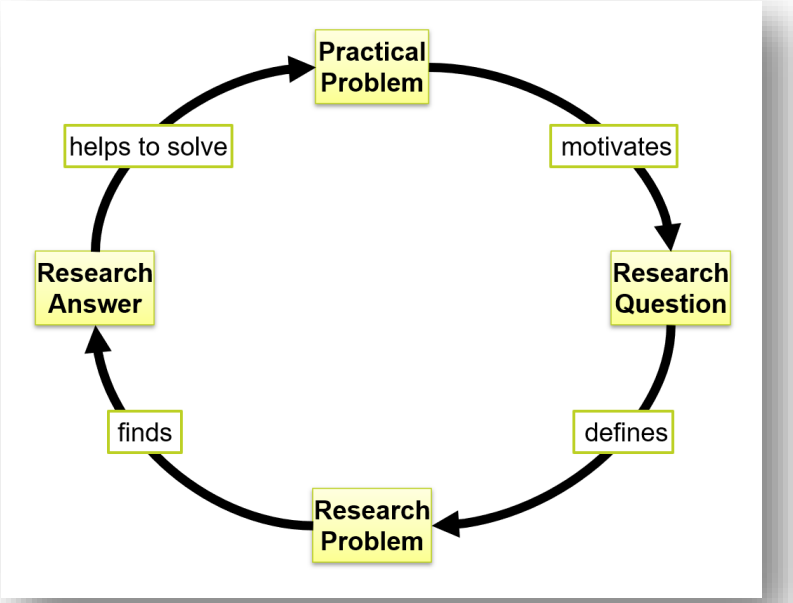
Research design: Central concepts

- **Practical problem**: Problem of relevance for somebody "out in the world".
  - **Aim/Purpose/Objective**: What will the research do for the practical problem "owner"?
- **Research question (RQ)**: Addresses a knowledge gap: What is it that we do not know about the problem? (that we need to know before being able to solve it?)
- **Research problem**: How do we answer the RQ?
  - How do we design our research?
  - What data do we need?
  - How do we collect that data?
  - How do we analyze that data?
- **Research answer**: What does the data and analysis tell us about the practical problem?
  - How do we draw conclusions?



Research design: Central concepts

- Typical **data generation tools**:
  - Opinion surveys.
  - Interviews and workshops.
  - Usability tests.
  - Observations of practices.
  - System usage logs.
  - Documents.
- Typical **data analysis methods**:
  - Quantitative analysis.
  - Qualitative analysis.
  - Mixed analysis.
- **Research proposal**: A logical plan for conducting empirical research.



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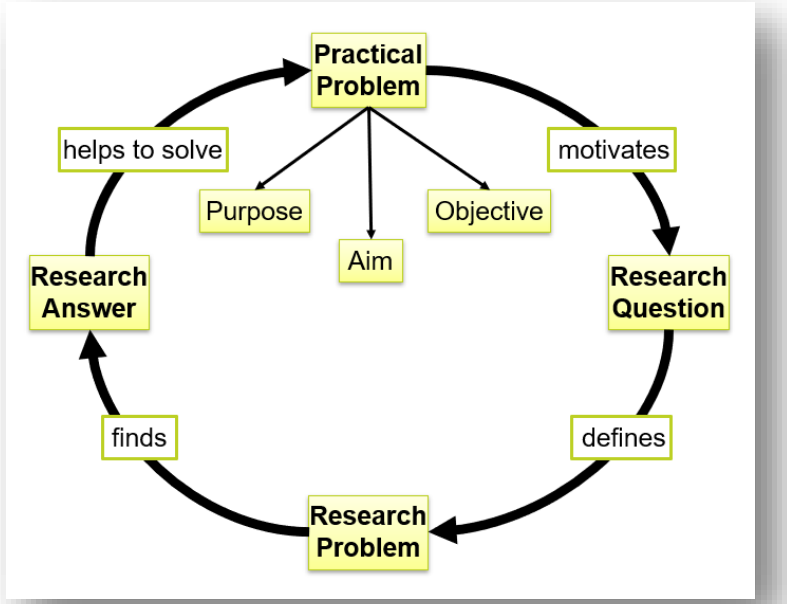
Research design example

- Problem description (same):
  - Because of the pandemic most employees in company X now work from home. Your boss asks you to find/buy/build a new social media tool for the employees to stay connected and socialize.
- Task:
  - Create a short description of a **research proposal** consisting of 1) Purpose/objective, 2) Research question, 3) Empirical data needed to answer the research question and how to collect this data.
- Process:
  - Break-out rooms. The person with the first letter in his/her first name earliest in the alphabet takes notes.
  - Spend 7 minutes to discuss the research proposal.
  - Spend 5 minutes to write down the proposal.
  - Once back in the main room you can post it to Padlet (link in chat window) anonymously. We will upload all the plans after the lecture.
  - You can use both Norwegian and English to write your plan.



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A research design framework

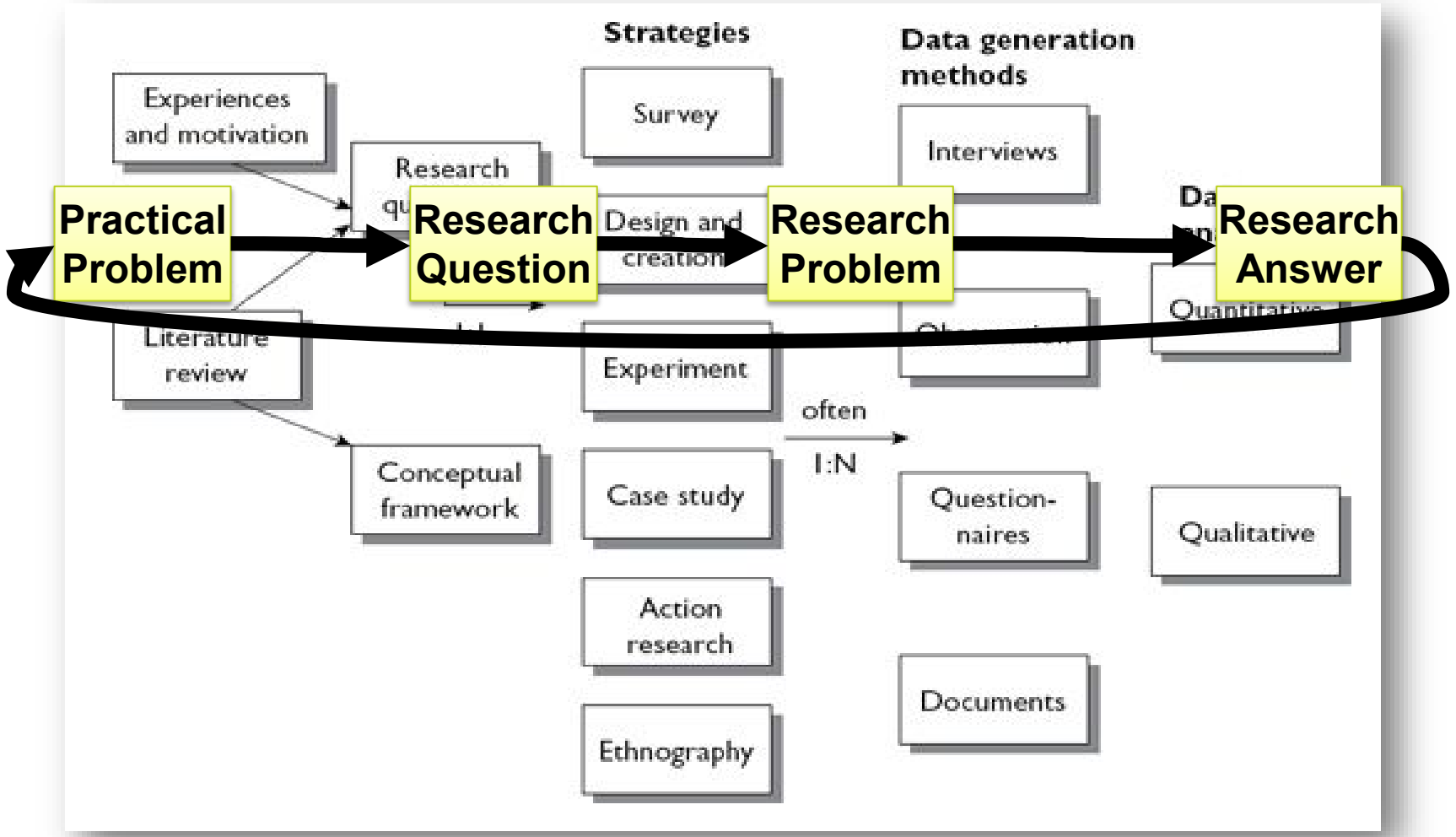
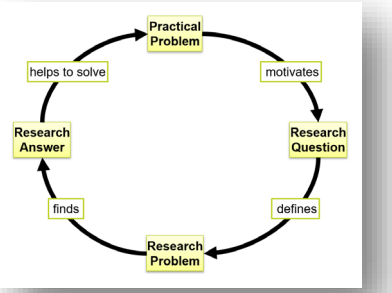
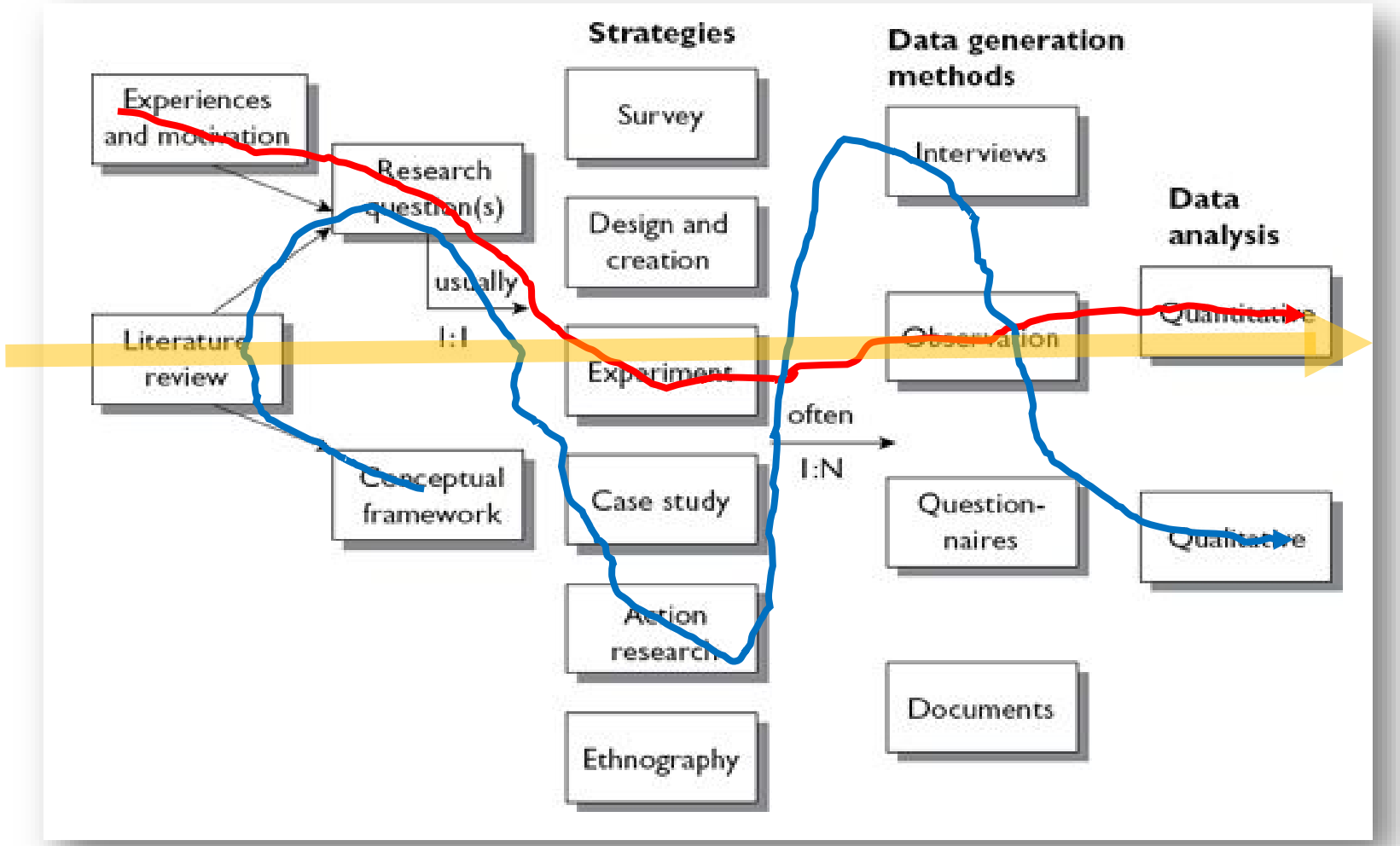


Figure 3.1 in: B. J. Oates, *Researching Information Systems and Computing*. London: Sage Publications, 2006.



Finding your way



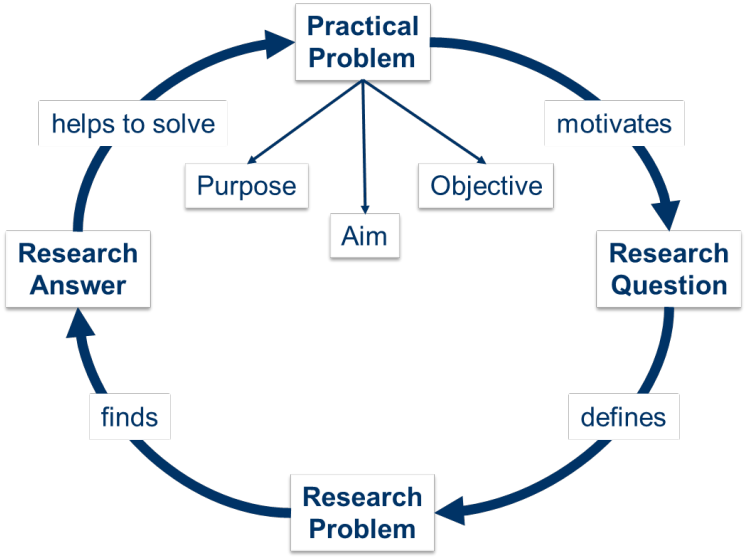
One iteration in this course!

Figure 3.1 in: B. J. Oates, *Researching Information Systems and Computing*. London: Sage Publications, 2006.

IT3010 Learning objectives

- You will get knowledge of:
  - How to design a research study in computer science and information systems (through choosing a research strategy).
  - How to select data collection and analysis methods.
  - How to discuss implications of your research.
  - How to write up and present your research.

- You will acquire competence in:
  - Conducting empirical studies.
  - Critically evaluating the quality of empirical studies in computer science and information systems.
  - Dealing with research literature.



Is all this supposed to be relevant for me?

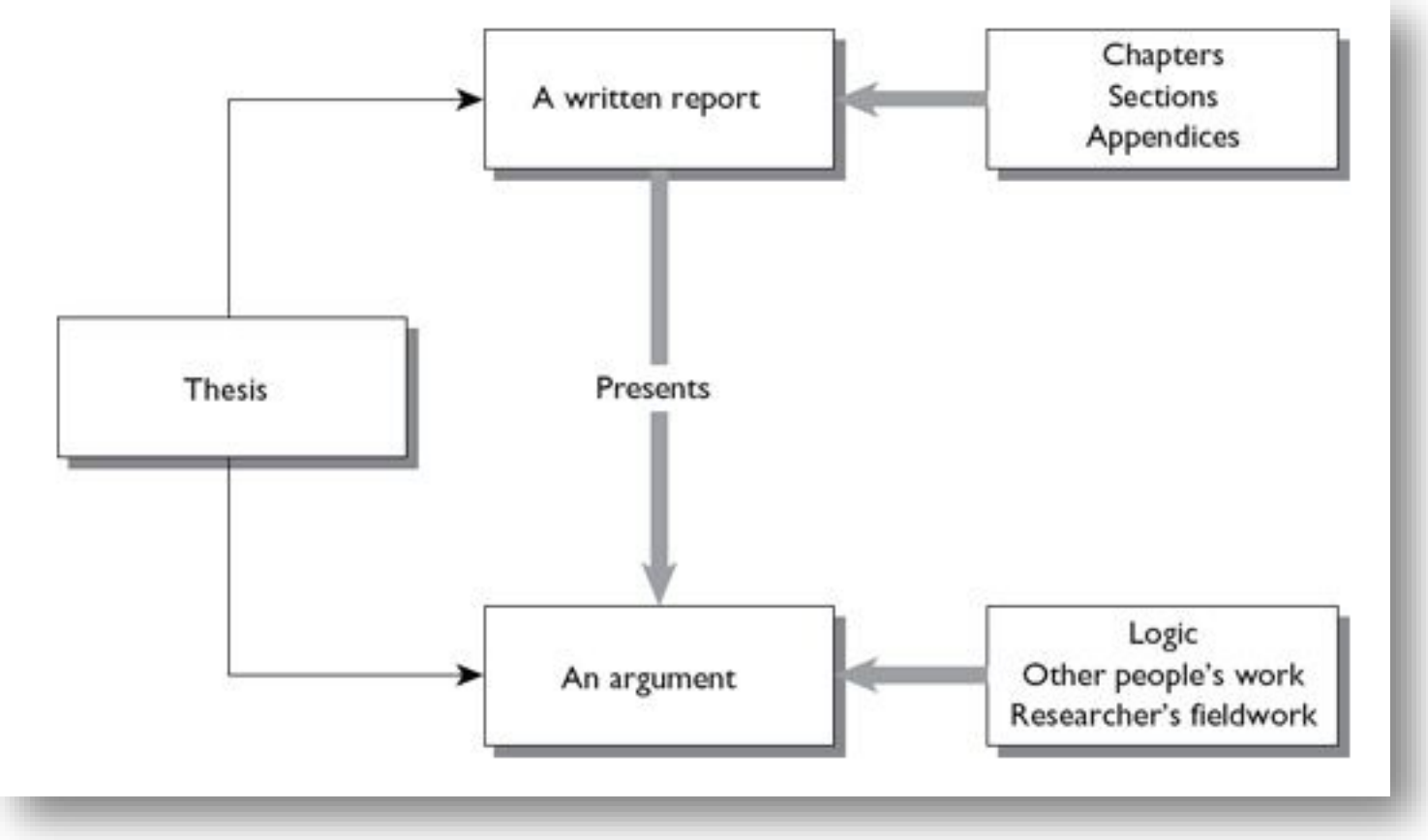


Figure 1.3 in: B. J. Oates, *Researching Information Systems and Computing*. London: Sage Publications, 2006.

Is all this supposed to be relevant for me?

- Research skills are essential for any type of critical thinking and decision-making.
- Both professionally:
  - Acquiring or developing IT products.
  - Evaluating techniques and tools for IT development.
  - Evaluating usability and/or utility of IT products.
- And privately:
  - Evaluating the rigor of the information you are exposed to every day.
  - Critically examining the validity of claims.
- Examples are endless!

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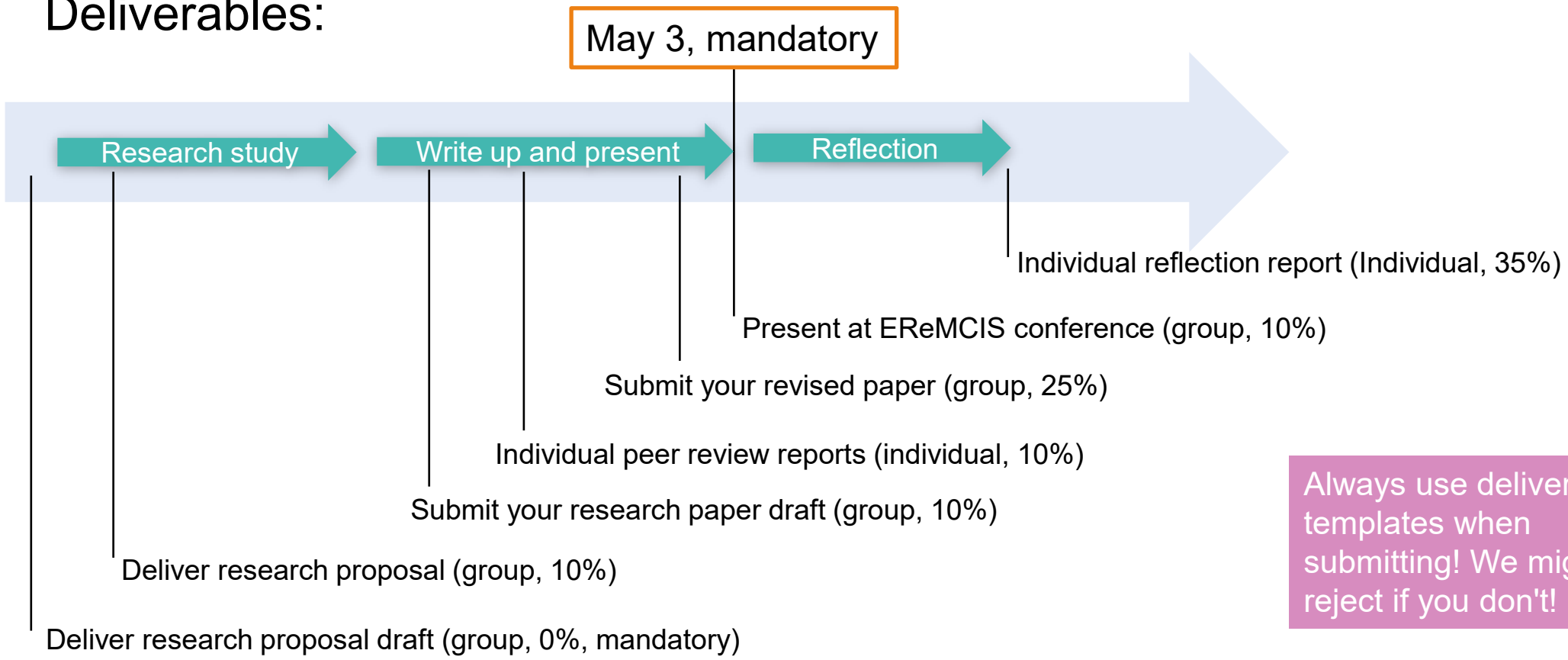
Assignments

- You will learn the **process** of conducting, writing up and presenting your research.

See Blackboard for deadlines.

- Deliverables:



Always use deliverable templates when submitting! We might reject if you don't!

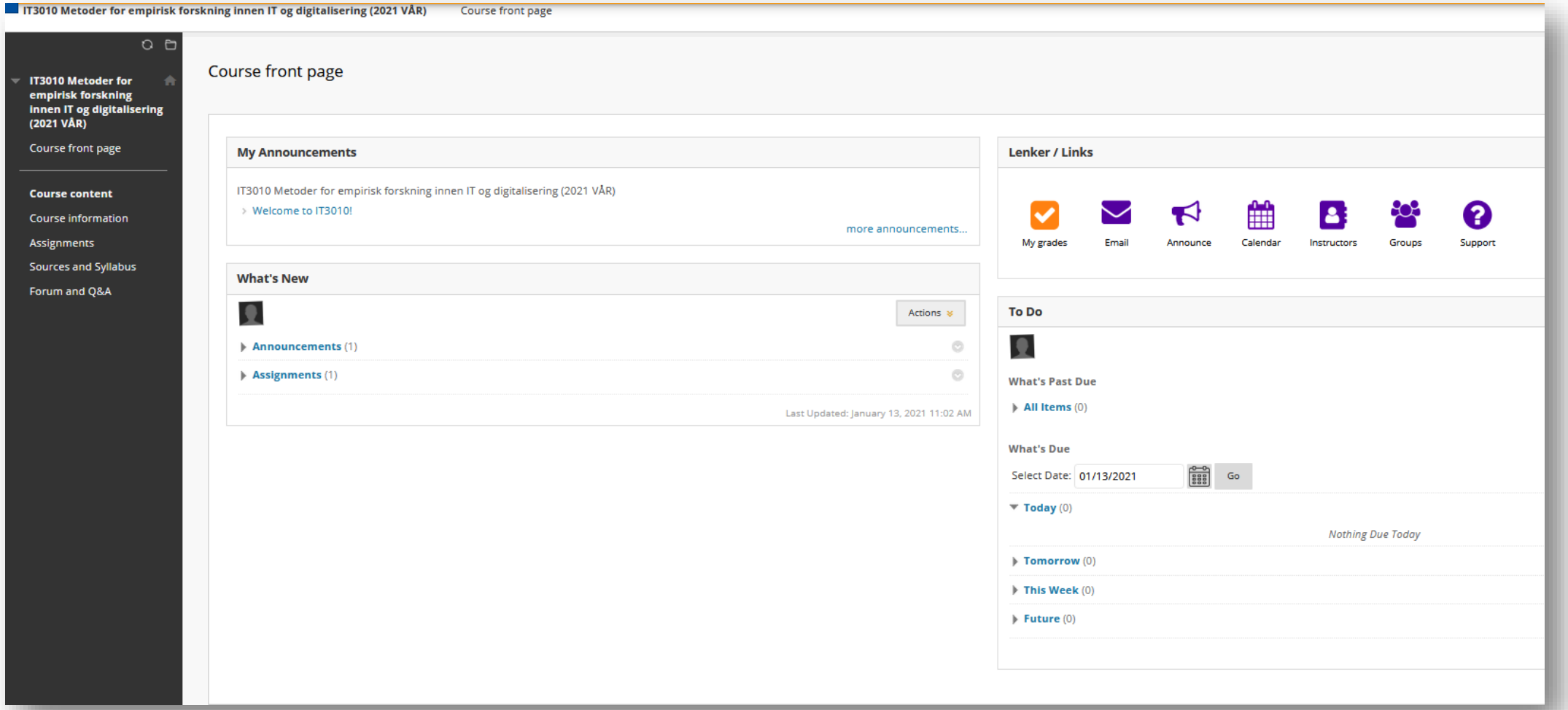
EReMCIS

- EReMCIS 2020 proceedings.

Groups

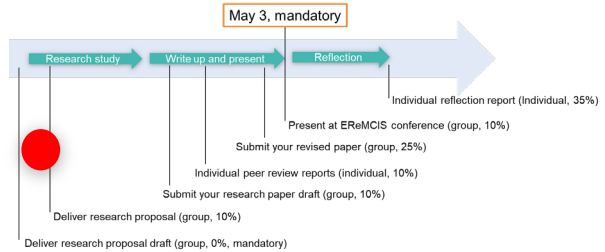
- All exercises except the peer review report and the reflection report will be done in groups.
- Groups will be announced next week. Please remember to fill in the form.
- Find your group members in Blackboard and meet ASAP!
- If you cannot reach a member in your group (e.g no response), let us know ASAP!

All communication via Blackboard



Assignment 1: Research proposal

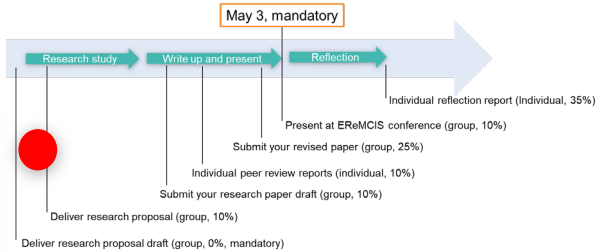
- Is the basis for all other assignments.



- Groups will deliver draft proposal in BB.
- Each group will receive written feedback in BB.
- Each group will have a 30 minutes meeting with one of course staff.
- The plan will be followed during the research project.

Assignment 1: Research proposal

Read the call for paper carefully!



Fourth Student Symposium on Empirical Research Methods in Computer Science and Information Systems (EReMCIS 2020)

Trondheim, Norway

April 30th, 2020, at IDI, NTNU

It is a pleasure to invite you to the 4th IT3010 Student Symposium on Empirical Research Methods in Computer and Information Sciences (EReMCIS 2020). The symposium is organized by the two courses: IT3010 – Research-based Innovation Methodologies in Computer and Information Science –, and DT8111 – Empirical Software Engineering – at the Computer Science Department. It will take place at NTNU, IDI, on April 30th, 2020, 09:00-16:00. (Exact location to be announced later).

The symposium will include invited presentations by the students of the IT3010 and DT8111. All groups are requested to submit a paper no later than the dates specified below.

Objectives and themes

The symposium will present cutting-edge research results by the students of the IT3010 and DT8111 courses. Empirical research method is at focus. Each presentation addresses an exciting research topic within various areas of computer sciences, software engineering and information systems. The theme of the symposium is to demonstrate that relevant and rigorous empirical research can be done even in small projects with limited time and resources.

Proposed list of themes and empirical application areas

Groups are requested to submit one paper each within one of the themes and empirical application areas listed below. (Tip!: You can also take a look at the project database for master students at IDI, see e.g. http://www.idi.ntnu.no/education/fordypningsprosjekt.php?s=2).

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