Software Evolution & Developer Productivity Seminar

Seminar, HS23, hasel.dev/teachings/hs23-sedp

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Course infos, slides, guidelines, examples, and more:
hasel.dev/teachings/**hs23-sedp**

Slides:
hasel.dev/**hs23-sedp-slides**

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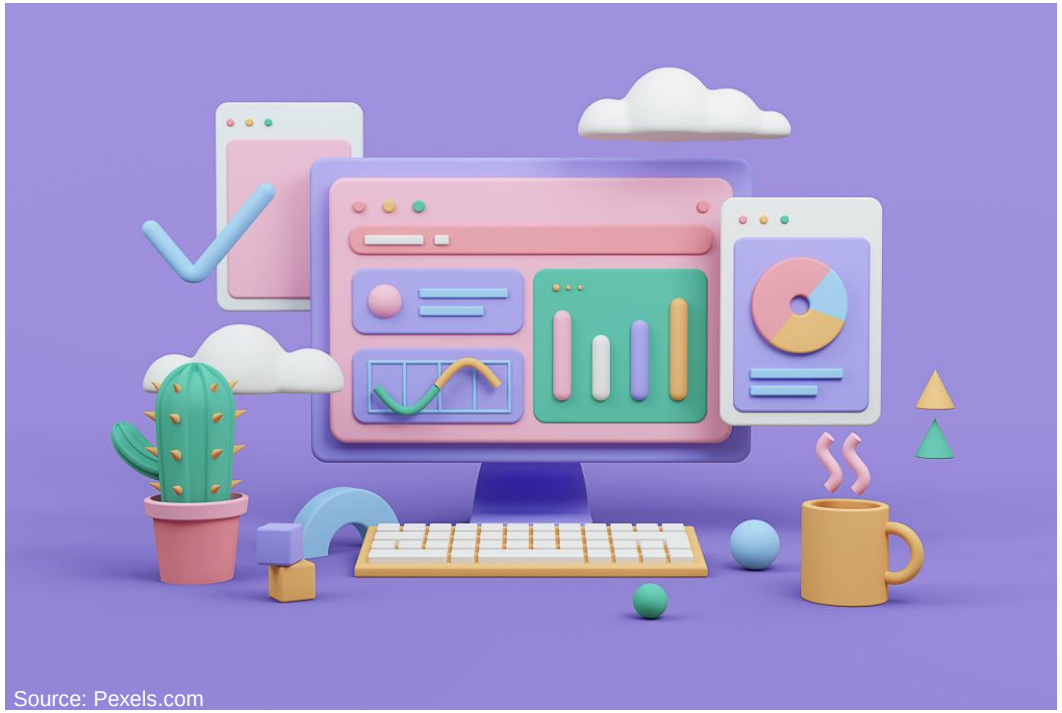
Introduction: How to perform a Literature Review and write a Research Proposal

Overview

What is this seminar about?

- **Research in software engineering** (SE)
  - Software evolution
  - Developer productivity

- Identifying a research question and **determining how to address** it



Source: Pexels.com

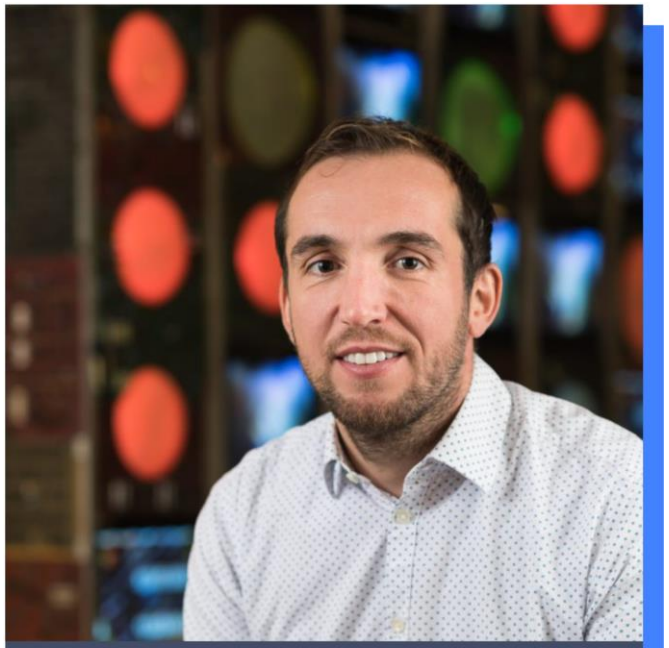
Learning Objectives

By the end of this seminar, you should…

- have gained a **deeper and broader understanding of SE research** by reading, analyzing, reflecting and discussing current and classic literature;
- be able to identify and **discuss research problems** and research questions as well as **identify relevant related work**;
- be able to **write a research proposal** in the form of a scientific report, and present and discuss ideas on an advanced topic in SE research with a focus on software evolution and developer productivity;
- be able to provide constructive **feedback on a research proposal**.

Course infos, slides, guidelines, examples, and more:
hasel.dev/teachings/**hs23-sedp**

Who is teaching this seminar?

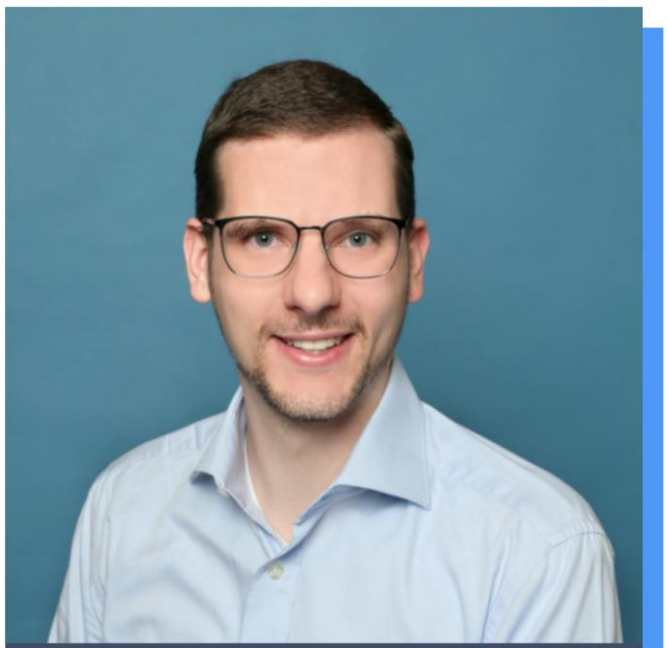


Thomas Fritz, Prof. Dr.
Associate Professor

fritz@ifi.uzh.ch
BIN 2.B.21

André N. Meyer, Dr.
Senior Research Assistant

ameyer@ifi.uzh.ch
BIN 2.B.20



Alexander Lill
Research Assistant

lill@ifi.uzh.ch
BIN 2.B.17

More about Alexander Lill

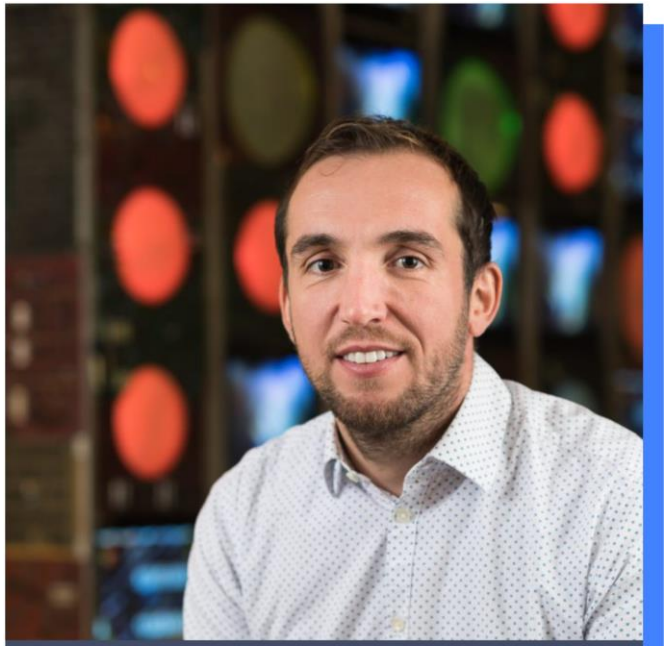
PhD Candidate @ HASEL

Research: developer **information needs (focusing on question asking and answering)**

Interested in **communication** and **knowledge management**

TV series, beer & whisky, pizza & coding

More about Thomas Fritz



Thomas Fritz, Prof. Dr.

Associate Professor

fritz@ifi.uzh.ch

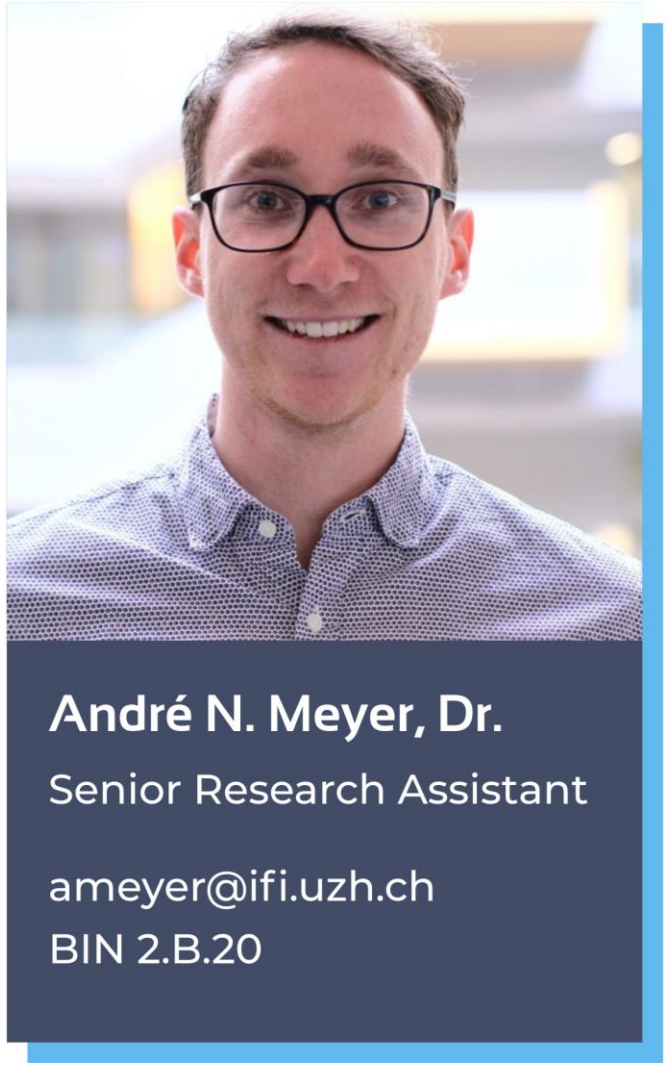
BIN 2.B.21

Associate Professor
at Human Aspects of Software Engineering Lab at UZH

Research
Developer Productivity and Wellbeing

- Understanding human and social aspects of developers at work
- (Biometric) sensing of cognitive and emotional states
- Supporting information needs and reducing distractions
- Developing approaches to foster productivity and well-being

More about André Meyer



Senior Researcher @ HASEL

Research: software developer and knowledge worker **productivity and well-being**

Interested in **research to industry transfer** (prev. SaaS, AI-MedTech startups)

Skiing, burgers, sushi, craft beers

University of Zurich[UZH] · Microsoft · OKOMO · THE UNIVERSITY OF BRITISH COLUMBIA · ABB · MIT GROUP · SCANDIAGS AI INTERPRETING ORTHOPAEDIC MRI

Contact me for theses or student projects: hasel.dev/**andre**

Seminar Organization

Requirements for this Seminar

- Who is this seminar for?
  - For **bachelor and master students** (3rd year and later)
  - Prerequisite: Content of Software Engineering and Programming
- Course language: **English**
- Work style
  - **Independent work** on response papers and proposal feedbacks
  - **Teamwork** (teams of two) on moderation and proposal

Registration for this Seminar

- Formally: in **UZH Modulbuchung / Seminar Booking Tool**
  - You **need an approved spot** in the Seminar Booking Tool
  - If you decide to quit the seminar (after being approved), **cancel your booking asap** (so others on the waitlist can move up)
  - **Check:** did you receive a confirmation from the booking tool?

- **Register via email by 22.09.2023 1pm** to André and Alexander (submit preferences for topics and team, as well as email address used for Perusall)
  - Note that the course is **limited** to 16 students
  - **First teams who register both** get a spot. We'll let you know by 23.9.2023 EoD.
  - If you decide to **quit the seminar** (after registering), **let us know asap** (so others can join instead)!
  - If you **don't get a spot**, write a motivation letter (email to André and Alexander) and we will let you know if a new spot becomes available.

Overview: Seminar Structure

- **Response Paper & Discussion Phase [first 5 weeks]** ***3 ECTS (90h) → ca. 2/5 for this phase (40h)***
  - Reading, reviewing and discussing papers on 5 topics
  - Individual work for 4 topics: 4 response papers (one each week)
  - Teamwork for 1 topic: presentation & lead in-person group discussion (mandatory attendance)

- **Research Proposal Phase** ***3 ECTS (90h) → ca. 3/5 for this phase (50h)***
  - Teamwork: draft a research proposal, present it & receive feedback
  - Teamwork: improve proposal draft and submit final version
  - Individual work: give feedback to others' proposals (peer review)
  - Teamwork: present your proposal to the group

Details: Response Paper & Discussion Phase (first 5 weeks)

- During the first five weeks: weekly reading and discussion

- **If you're the moderator team of the topic [for 1 out of 5 topics]:**
  - Actively read and discuss the 1 assigned paper on Perusall
  - Identify 1 additional, related paper
  - Prepare a presentation of the assigned and identified paper (max 15 minutes)
    Hint: make sure to discuss the relation between the 2 papers and their major contributions, not just summarize one after the other
  - Prepare a discussion that you will moderate in class (25 minutes)
- **If you're not the moderator of the topic [for 4 out of 5 topics]:**
  - Actively read and discuss the 2 papers on Perusall
    Hint: reflect on them, add comments/questions and respond to others' comments/questions
  - Identify 1 additional, related paper
  - Write a short response paper (max 250 words, excluding references) to answer the topic-question
    Hint: focus on major contributions, what you find important/interesting, answer the question we ask, not just summarize the papers
  - Actively participate in the class discussions

Details: Research Proposal Phase

In (the same) team of two:

1. Identify a relevant **research problem** / research question in the assigned topic area
2. Perform a **literature review** (main part)
3. Write a **draft proposal**
   Format: max 3 pages in double column format plus max 1 page for references
   Include: motivation, research problem/question, related work, show relevance (research gap), and approach or study method/design
4. Present your draft proposal (+ receive feedback from us and class)
   Presentation: max 5 minutes, and 4 minutes questions
5. Adjust proposal based on feedback → write **final proposal**
   Format: max 6 pages in double column format plus references
   Include: complete related work section (main part), more detail on how to address/answer the research question (i.e., study design/approach) and motivation for doing so (i.e., research gap)
6. Present your final proposal
   Presentation: max 8 minutes, and 5 minutes questions

Individual work:

– Give feedback to others' proposals (peer review)

– Actively participate in discussions

Grading & Assessment

- **Response Paper & Discussion Phase [25%]**
  - Active reading of assigned papers & interactive annotation and discussion on Perusall (individual)
  - Response papers & active class participation (individual)
  - Presentation and moderation of topics (team)

- **Research Proposal Phase [75%]**
  - Proposal draft and presentation (team) [10%]
  - Final proposal and presentation (team) [40% proposal, 15% presentation]
  - Peer review of others' proposal drafts (individual) [10%]

Seminar Topics

1. Productivity
2. SE with Generative AI
3. Socio-technical Nature of Software Development
4. Task Context
5. Developer Communication and Coordination

Seminar Topics: 1. Productivity

1. **Productivity**
   - What affects productivity?
   - How do developers perceive productivity?
   - What impedes productivity, and how can we foster it?
2. SE with Generative AI
3. Socio-technical Nature of Software Development
4. Task Context
5. Developer Communication and Coordination


Source: Pexels.com

Seminar Topics: 2. Software Engineering with Generative AI

1. Productivity
2. **SE with Generative AI**
   - How can generative AI support software engineering, and what are the chances and risks?
   - Will we soon no longer write code, but just use natural language?
3. Socio-technical Nature of Software Development
4. Task Context
5. Developer Communication and Coordination


Source: Pexels.com

Seminar Topics: 3. Socio-technical Nature of Software Development

1. Productivity
2. SE with Generative AI
3. **Socio-technical Nature of Software Development**
   - How is software split into components/modules to reduce dependencies between teams and the software?
   - How much do the social networks overlap with the technical ones, and how does this overlap affect productivity?
4. Task Context
5. Developer Communication and Coordination

Source: Pexels.com

Seminar Topics: 4. Task Context

1. Productivity
2. SE with Generative AI
3. Socio-technical Nature of Software Development
4. **Task Context**
   - Which context is needed to perform code change tasks?
   - How to provide developers with access to task context?
   - How to detect task context switches?
5. Developer Communication and Coordination


Source: Pexels.com

Seminar Topics: 5. Developer Communication and Coordination

1. Productivity
2. SE with Generative AI
3. Socio-technical Nature of Software Development
4. Task Context
5. **Developer Communication and Coordination**
   - How do developers communicate and what do they exchange on different means of communication?
   - What are communication challenges and how to address them?


Source: Pexels.com

Group Exercise

Slides:
hasel.dev/**hs23-sedp-slides**

In **groups of two**, pick one of the following topics and **discuss the questions together** for 5 minutes.

1. Productivity
2. SE with Generative AI
3. Socio-technical Nature of Software Development
4. Task Context
5. Developer Communication and Coordination

Be prepared to share your **main insight per question**.

Hints for Successful Participation in the Seminar

Hint: Reading & Reflecting on a Research Paper

- Reading a paper is not about just summarizing it (ChatGPT can do that!)
- Instead, it's about **reflecting on the paper:**
  - Reading *critically*, e.g. are the authors solving the right problem?, what are limitations of the work?, are the assumptions reasonable?
  - Reading *creatively*, e.g. what are the good ideas?, how could the work be meaningfully extended?, how could the approach be applied in the field?
  - Comparing it to other publications, research, concepts, ideas, products
  - Thinking about its contributions, implications, opportunities for improvement or extensions (but don't just say "it needs more participants"), how could future work look like?

- Therefore, **on Perusall:**
  - Create an account and send us the used email address to be invited
  - Add notes, comments and questions (can be seen by peers)
  - Comment on others' comments and questions

  → class discussions work better if everyone has read and reflected on the paper

Hint: Short Response Papers

- After reading the research papers, find one more suitable, related paper
  Note: it has to be a peer-reviewed, full paper (min 9 pages) and from a top tier conference or journal
  (e.g. ICSE, FSE, CHI, CSCW, TSE, TOSEM, ToCHI)
- Then, write your **response paper** (max 250 words, excluding references):
  - Answer the topic-question (see website) using all the 3 papers that you've read
  - In the scope of answering the topic-question, focus on the major contributions, connections between papers, possible extensions, what you find important/interesting, implications/applications, potential for improvement
  - Do NOT just provide a summary
    (being asked about a movie you recently saw, you wouldn't just summarize it either)
  - Write it in your own words (without Generative AIs)
  - Grading is based on "thoughtfulness"

- Finally, submit it
  - Due by **midnight before class**
  - Send to André and Alexander in the format (Lastname_Firstname_Week[01-05].pdf>
  - We will send you written feedback

Hint: Moderating a Discussion

- With one other colleague, **moderate a discussion on the assigned paper/topic** in class:
  - First, actively read the 1 assigned paper and identify 1 additional, related one
  - Prepare a **presentation** of the two papers (max 15 minutes)
    Hint: make sure to discuss the relation between the papers and their major contributions, not just summarize one after the other.
  - Prepare a **discussion** that you will moderate in class (25 minutes)
    - Try to focus on the audience, their responses, thoughts and questions
    - Avoid “defending your opinion”, instead focus on asking open questions
    - Try to involve everyone (not just a few students)
    - The topic-question can serve as inspiration, but should **not** be the main focus of the discussion

Hint: Expectations to Research Proposal

Contents of the Research Proposal

- Identify a **relevant research problem** / research question in your assigned topic
  → motivate it well, meaning that you back it up using related work (i.e., what is the gap?)

- Provide a good overview of the area, categorizing related work (not just listing/summarizing it), describe commonalities, specialties, and differences (**main part**)
- Describe **how to address** the research problem / question (without really having to do it in practice)
  - Specify the **study design/method**
  - Could be a tool to be developed (and evaluated)
  - Could be a lab or field study to be performed
- Clarify **how your idea is different** and how it extends existing related work

- Important: critical and creative thinking, reflection on the topic

Hint: Expectations to Research Proposal 2

Expectations towards write-up and quality:

- Find a **suitable structure** for the research proposal
  Hint: Abstract, introduction, related work (2+ pages in final proposal), approach, study method, discussion, conclusion, references, word of honor
- Present your ideas in a **coherent and consistent** way (German: “roter Faden”)
- Sometimes, a good way to structure something (e.g. a field study design or categorization/comparison of related work) is to **visualize** it (e.g. as a flow chart or a table)
- Use correct and **understandable English**
  Hint: Presentation is very important, ask someone to proof-read and/or use Grammarly/Microsoft Editor
- Write in a **formal, scientific way** (e.g. “I like this paper” should not be in the proposal)
- Do **not just enumerate**/summarize related work, instead reflect on it
- Cite and quote correctly to avoid **plagiarism** (please read the UZH Fact Sheet)
- Use Latex **template** provided on the course website (you may use Overleaf)
- The expectations are higher for master than bachelor students
- Checkout the **examples** on the course website
- Additional hints on writing for a seminar: Sven Seuken’s Seminar Guideline

Hint: Expectations to Research Proposal 3

Word of Honor:

– At the end of your report, include a note on a separate page with your signature that states:

We, [first and last name] and [first and last name], hereby confirm that we have produced this work independently and have used no other than the listed tools and sources.

– Does not count towards the page limit

– Only required for the final version

– Uses of Generative AIs (ChatGPT, Bing AI, Bard, et al.) are not allowed (we will check!)

Hint: Giving Feedback on Research Proposals

Review Content

- Follow the template on EasyChair
- Start with a brief summary of the research proposal (2-3 sentences)
- Provide feedback on the **technical quality**, originality/novelty and significance
  Are the arguments in the paper correct? How original/novel is the proposal? How significant is the research question the authors pose? Is the research area well covered? What is good about the proposal and what could (concretely) be improved?
- Provide feedback on the **logical structure**, presentation and style:
  Is the paper coherent and well-written? Are concepts and approaches well-explained? Are graphics/tables used appropriately? Is it easy to follow and clear? How (concretely) could it be improved?

Review Style:

- Review 2 proposals on EasyChair
- Provide your review and grade them with the following options: accept, weak accept, weak reject, reject
  Note: The proposal will be graded by André and Alexander, so you can provide critical,
  but constructive feedback without negatively influencing the authors' grade.
- Be constructive, polite and positive
- Examples of good reviews will be added to the course website

Hint: Presenting your (Draft) Proposals

Your slides:

- Have a flow / **storyline**
- **Motivate** the topic (e.g. motivating example), explain concepts, provide an overview
- Sensible use of **animations** (no animations is usually better)
- Meaningful use of **visualizations** (not just text)
- **Avoid** having too many slides, too much text, actual sentences, too many bullets, too small fonts

Your presentation:

- **Duration** for draft proposal is 5 mins and for final proposal is 8 mins (don’t exceed the time limit!)
- **Practice** the talk beforehand and don't read from slides
- Check your presentation with the projector beforehand in the specific classroom

Tools & Links

- Main Website: https://hasel.dev/teachings/hs23-sedp/
- VVZ: UZH Course Catalogue
- Perusall (for paper reading, annotation and discussion): https://app.perusall.com/
- EasyChair (for submitting proposals and reviews): https://easychair.org/conferences/?conf=sedp-hs23

Schedule Overview

Most updated version, always on:
hasel.dev/teachings/**hs23-sedp**

Date and time	Topic/deliverable
21.09.2023 14:00 – 15.45	**Kick-off**
Response Paper & Discussion Phase	
22.09.2023 13:00	**Submission of 3 paper preferences** and partner via Mail to Dr. André Meyer and Alexander Lill
28.09.2023 14:00 – 15.45 (BIN 1.D.29)	**Topic 1: Productivity**
05.10.2023 14:00 – 15.45 (BIN 1.D.29)	**Topic 2: Software Engineering with Generative AI**
10.10.2023 14:00 – 15.45 (BIN 1.D.29) (**note:** it's on a Tuesday instead on a Thursday)	**Topic 3: Socio-technical nature of development**
19.10.2023 14:00 – 15.45 (BIN 1.D.29)	**Topic 4: Task Context**
26.10.2023 14:00 – 15.45 (BIN 1.D.29)	**Topic 5: Developer Communication and Coordination**
Proposal Phase	
01.11.2023 23:59	**Submission of draft proposals** on EasyChair The proposal should be max. 3 pages double-column format plus max. 2 for references, ACM Format see more details below
02.11.2023 14:00 – 15.45 (BIN 1.D.29)	**Presentation of draft proposals** (per team max. 5 minutes presentation + 3 minutes Q&A)
05.12.2023 23:59	**Submission of final proposals** on EasyChair The proposal should be max. 6 pages double-column format plus max. 2 for references, ACM Format see more details below
09.12.2023 23:59	**Peer Review due** (also on EasyChair)
14.12.2023 14:30 – 17.30 (BIN 1.D.29)	**Presentation of the proposals** (per team max. 8 minutes presentation + 4 minutes Q&A)

Next Steps & Deadlines

- Check/update course registration in the Seminar Booking Tool

- **Send an email** to André and Alexander by 22.09.2023 1pm (each team member)
  - 3 topic preferences
  - Partner (let us know if you need help with finding a partner)
  - Create a Perusall account and send us the used email address

- **For Topic 1**
  - Read the 1/2 assigned papers on Perusall, actively annotate and interact
  - Identify a 3rd related paper
  - If you moderate: prepare a presentation and discussion
    Hint: send slides to André and Alexander before the start of the seminar
  - If you don't moderate: write a short (max 250 words) response
    Hint: send to André and Alexander in format Lastname_Firstname_Week[01-05].pdf,
    latest by midnight before class

How to perform a Literature Review and write a Research Proposal

Quick break?