TDDD89

Lecture 1

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Part I

- Course format
- Activities
- Examination

Part II

- Starting your thesis project:
  - What is a *good* thesis project?
  - How do you start?

Part I

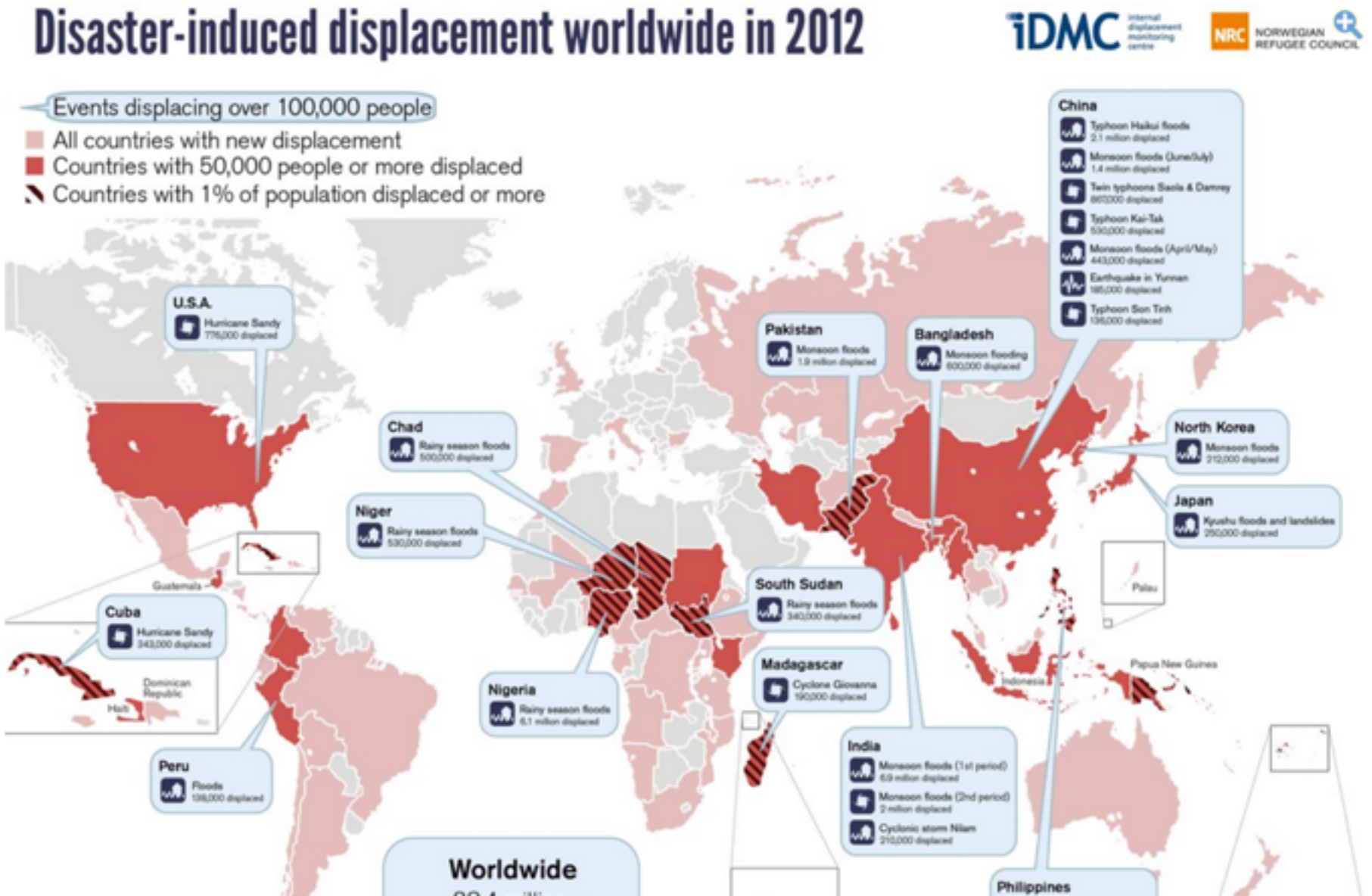
Course format

- Select a thesis topic
- 3x2h lectures
- 6x2h seminars
  - 4x2 students
  - theme-specific groups
  - Ola Leifler, Aseel Berglund & Jonas Wallgren

Interlude

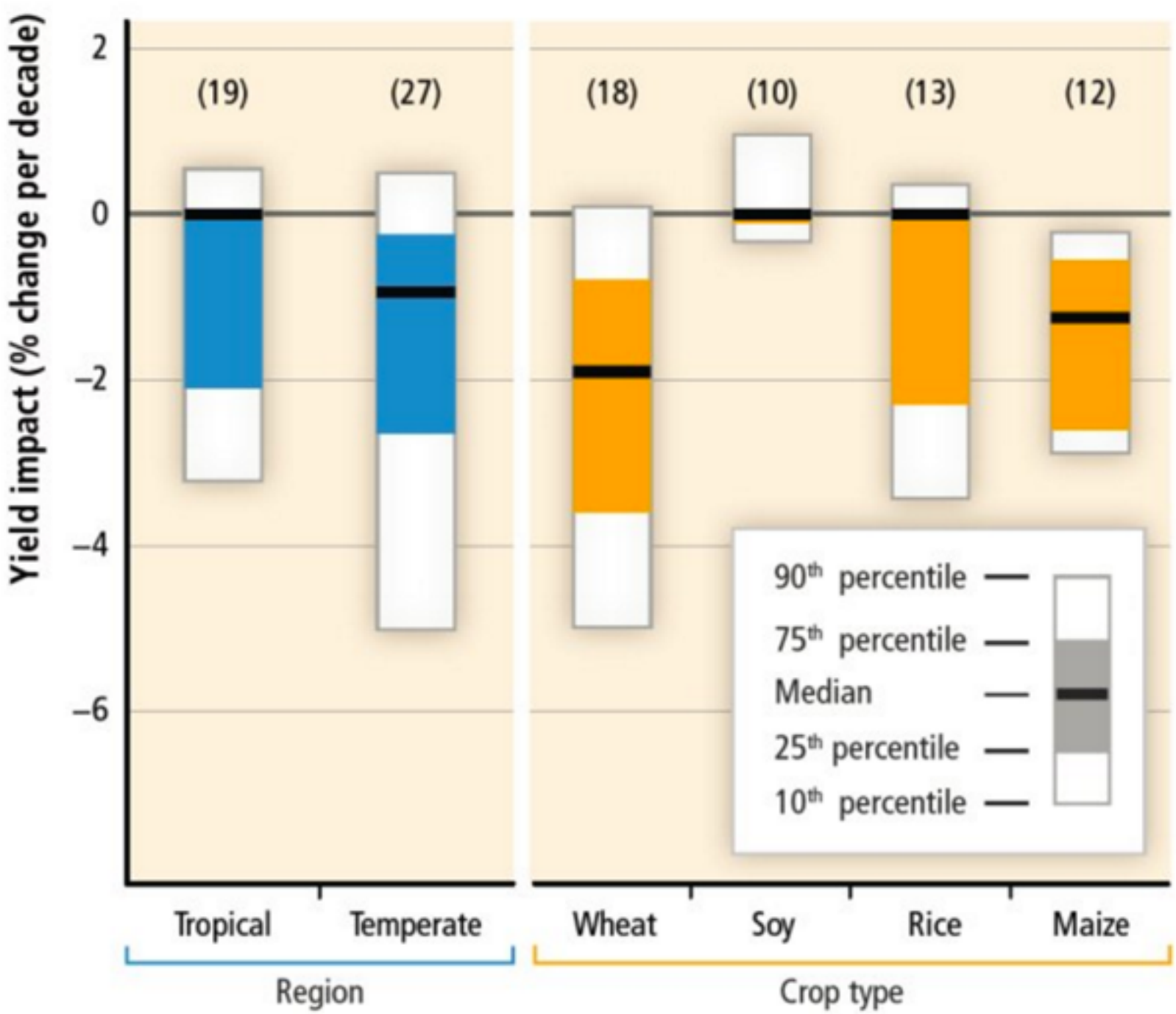
Climate Change

2. Hundreds of millions of people will be forced to move by 2050.



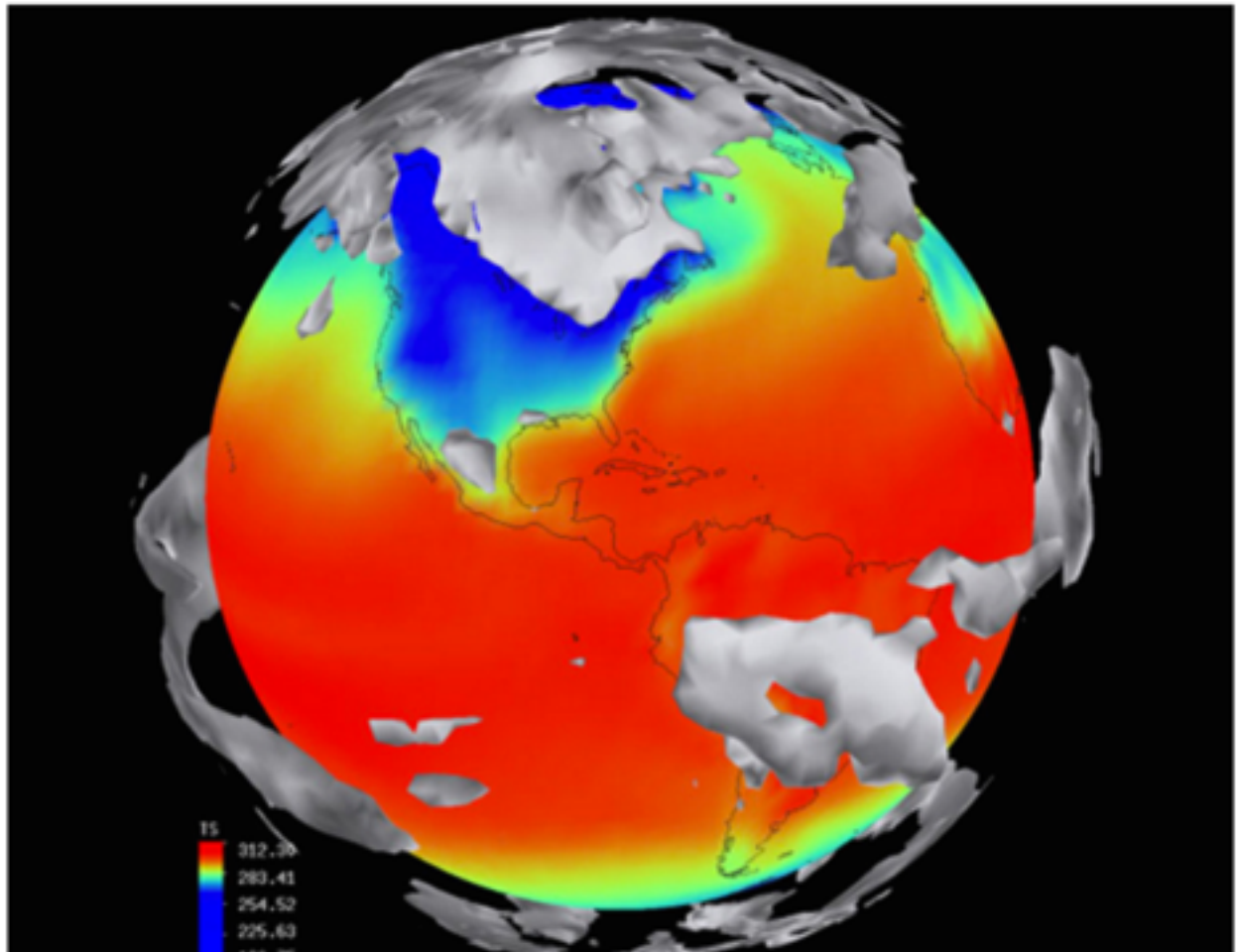
5. Water scarcity will hit hundreds of millions of additional people by 2100.

The California water crisis, in one photo.


Yield impact (% change per decade)
2
0
−2
−4
−6
(19)
(27)
(18)
(10)
(13)
(12)
90th percentile
75th percentile
Median
25th percentile
10th percentile
Tropical
Temperate
Wheat
Soy
Rice
Maize
Region
Crop type

How Coders Can Help Fight Climate Change

Climate models are built by scientists, not software engineers.



SMHI

Lena Strömbäck: lena.stromback@smhi.se

2015-10-08

Feature detection in hydrological data

Hydrological climate impact studies aims at understanding how a changes in future climate would affect the fresh water conditions. Typical questions are to understand changes to the risk of droughts or floods and access to drinking water. From a technical perspective a hydrological effect study is usually done by running information on future rain and temperature a large set of climate predictions through a series of processes including geographical and statistical rescaling and a hydrological model that can compute hydrological conditions, such a soil moisture, snow cover and river discharge.

Selecting a thesis topic

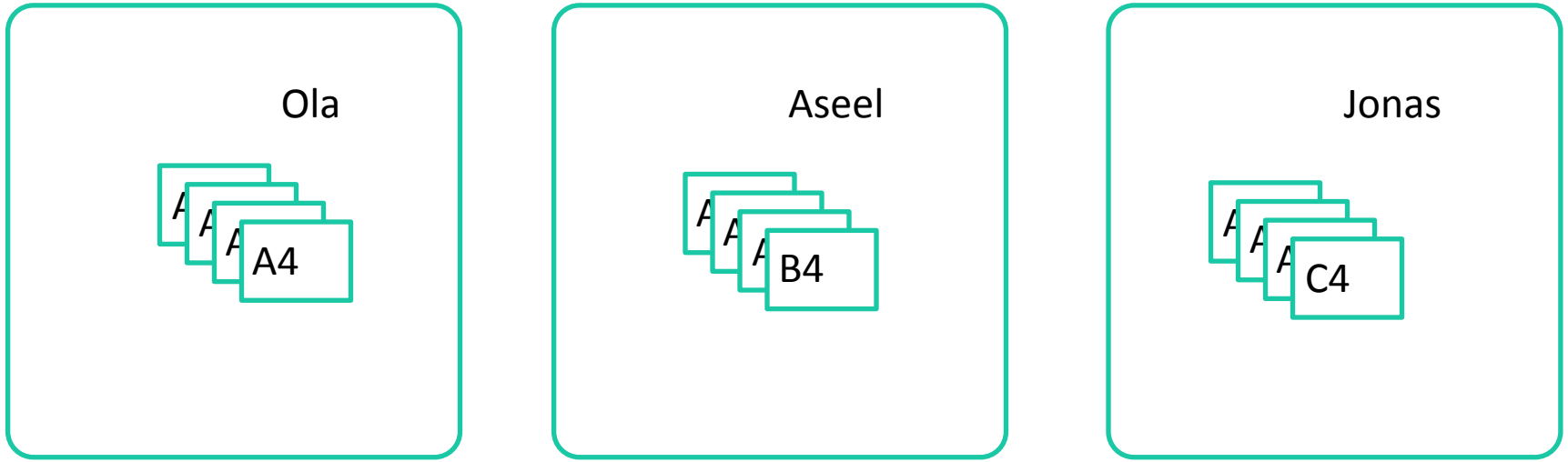
- Option 1: You have a thesis proposal that you will work with in your Master's thesis projects: great!
- Option 2: You find a thesis proposal from the list of proposals on the IDA web

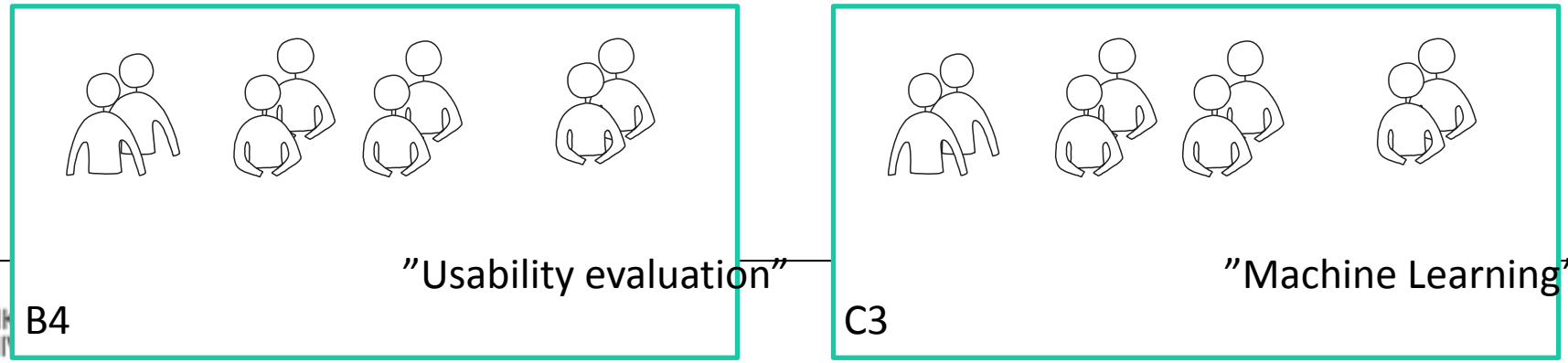
Lectures

1. What *is* a *great* thesis?
2. Learning and writing about a new subject area
3. Method

Seminar	Read	Write
1	Introduction	Thesis plan
2		Introduction
3	Theory	
4		Theory
5	Results, Discussion, Conclusion	
6		Method

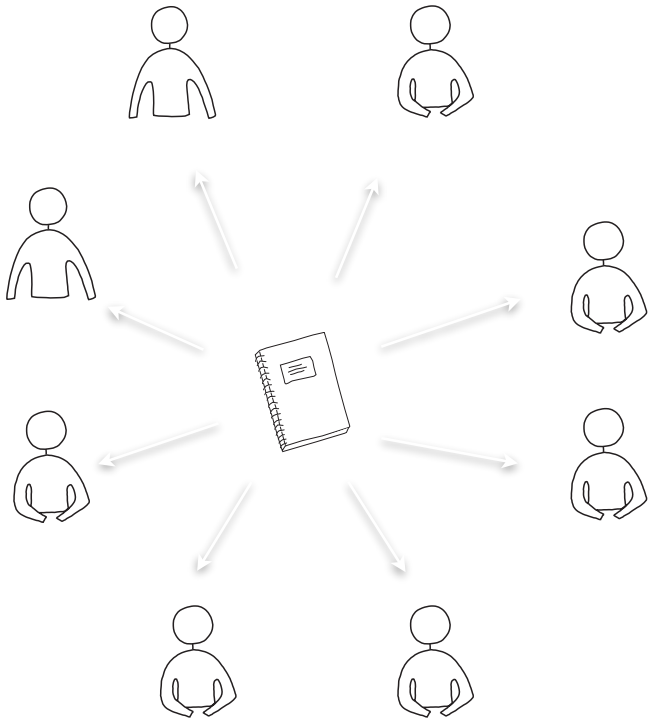
Seminar groups

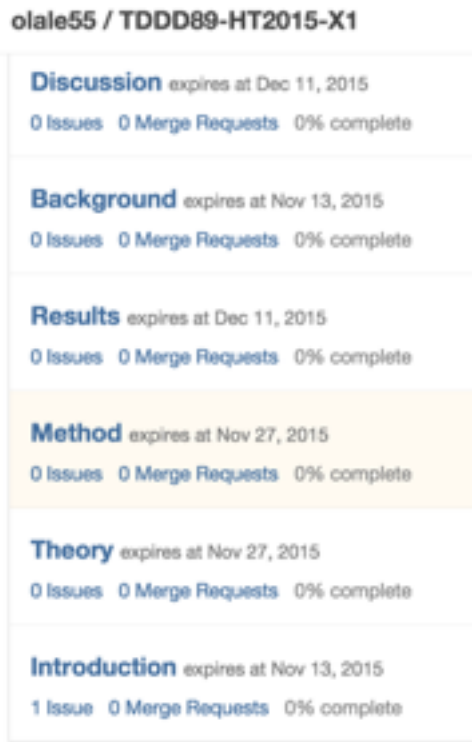




Gitlab - demo

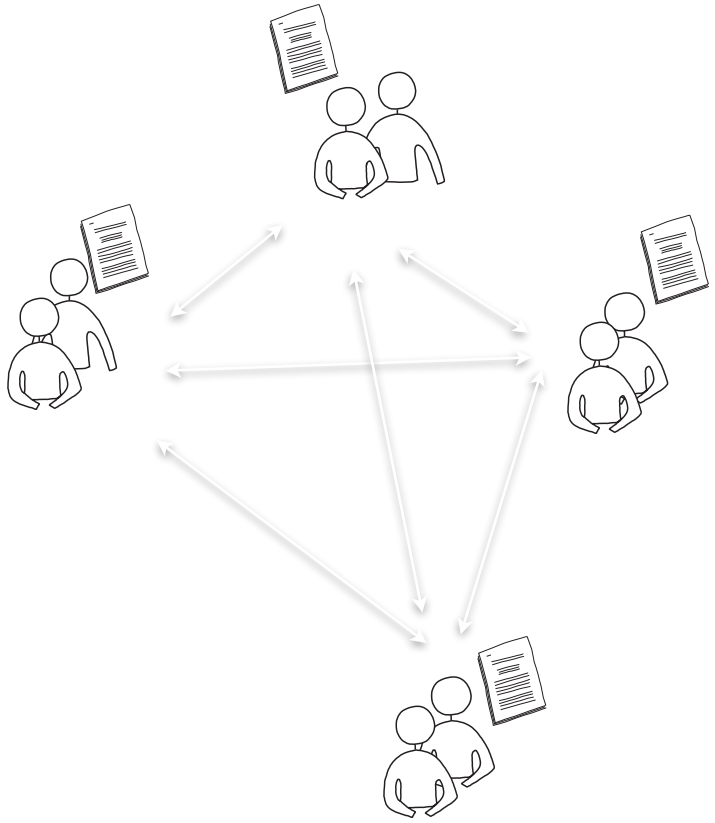
Seminar 1,3,5

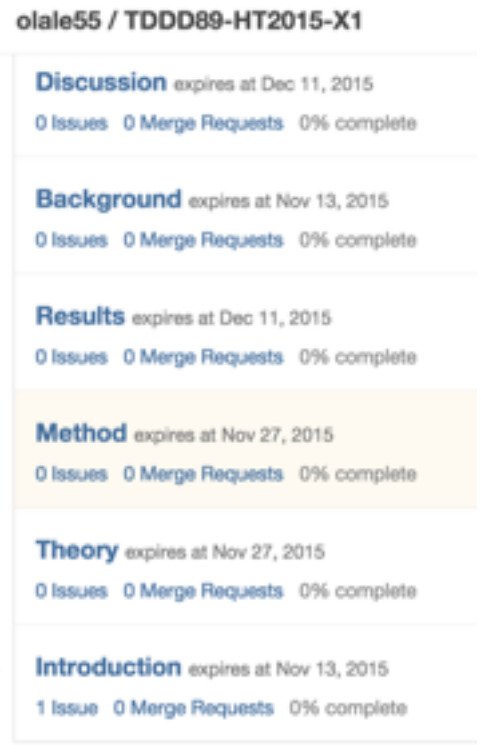




1 2 3

Seminar 2,4,6



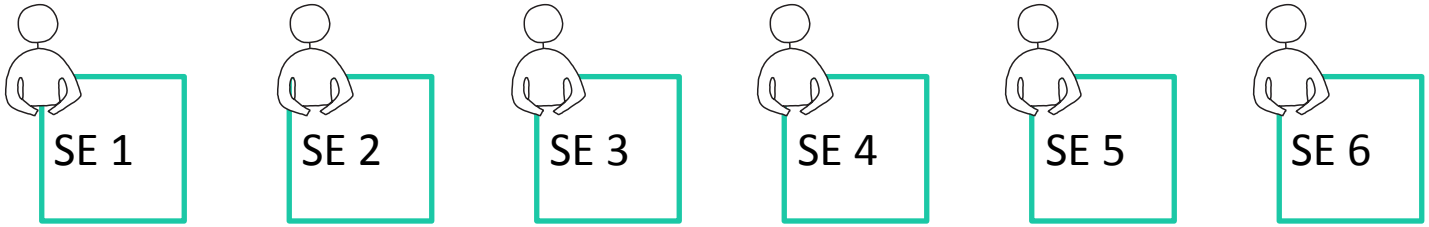

olale55 / TDDD89-HT2015-X1
Discussion expires at Dec 11, 2015
0 Issues 0 Merge Requests 0% complete
Background expires at Nov 13, 2015
0 Issues 0 Merge Requests 0% complete
Results expires at Dec 11, 2015
0 Issues 0 Merge Requests 0% complete
Method expires at Nov 27, 2015
0 Issues 0 Merge Requests 0% complete
Theory expires at Nov 27, 2015
0 Issues 0 Merge Requests 0% complete
Introduction expires at Nov 13, 2015
1 Issue 0 Merge Requests 0% complete

LISAM

Examination

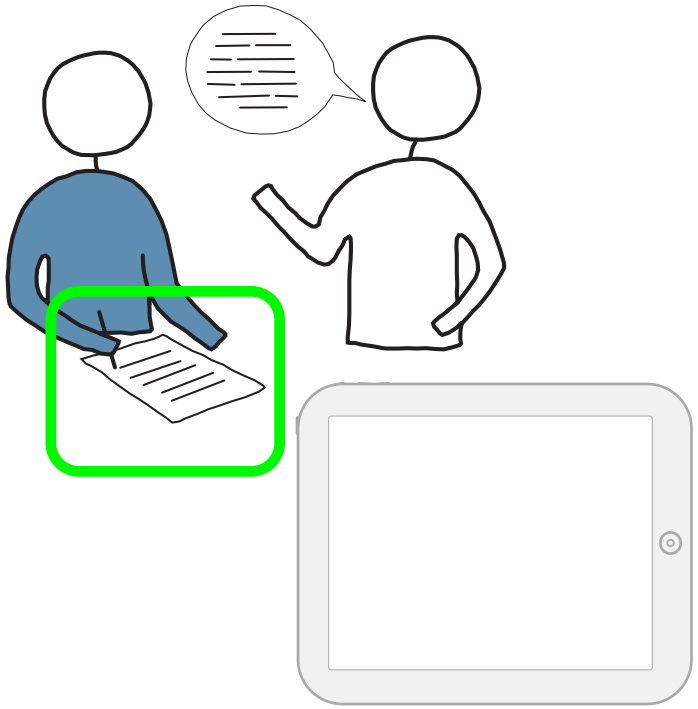
- UPG1: First three chapter of your thesis report at the end of the course
- UPG2: Preparation and participation in seminars during the course

UPG1



UPG2

Seminars



Final submissions

Review, rewrite

SE 6

URKUND

End of HT2

End of exam period for HT2

Part 2

What is a great thesis?

Thesis = project results + written presentation

- A working, interesting application with proven and general value
  - A well-described application
  - of general interest
  - and with a clear description of ”proven” and ”value”

What is a great thesis?

Thesis = project results + written presentation

- An evaluation with general and interesting results
  - that others can **use**
  - that others will **believe**

What is a great thesis?

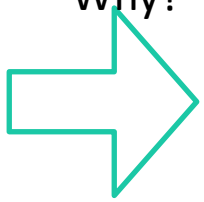
Thesis = project results + written presentation

- An authoritative report
  - with a good focus (questions!)
  - and results that answer the questions
  - through a transparent, thorough description of the process

Starting your thesis work

”Evaluate algorithms to be used for image clustering”

Why?

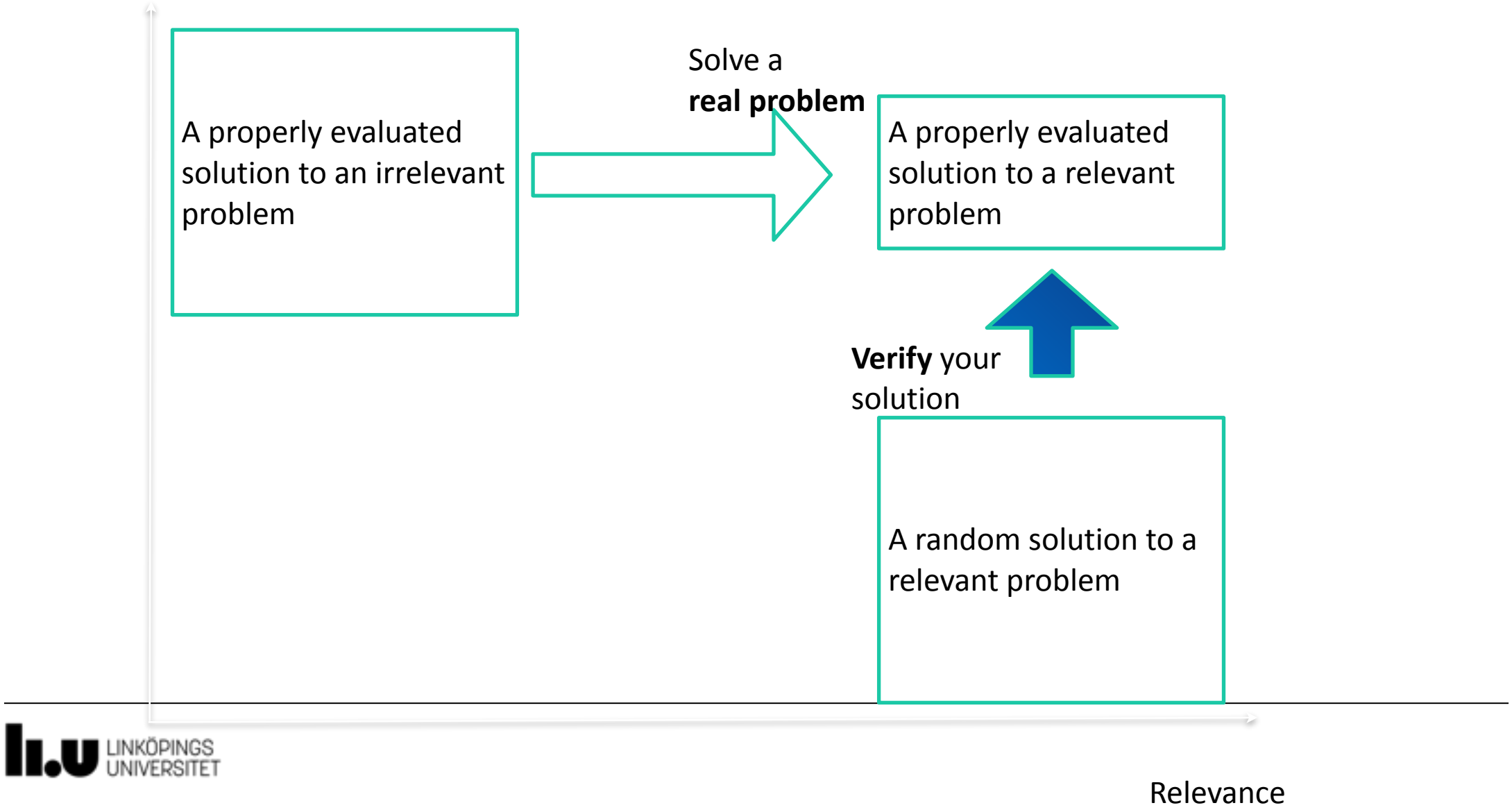


”Determine whether clustering algorithms can be used to detect activities in sets of images”

How?

”Find activities in sets of images”

Relevance/Rigor



Thesis outline

Why should even I read this report?

What have you studied here?

What does this relate to?

Should I trust you?

What is built?

What have you found?

How can we explain the results?

How can I use these results in my work?

Thesis outline

Abstract

Research Questions

Theory, Background

Method

Implementation

Results

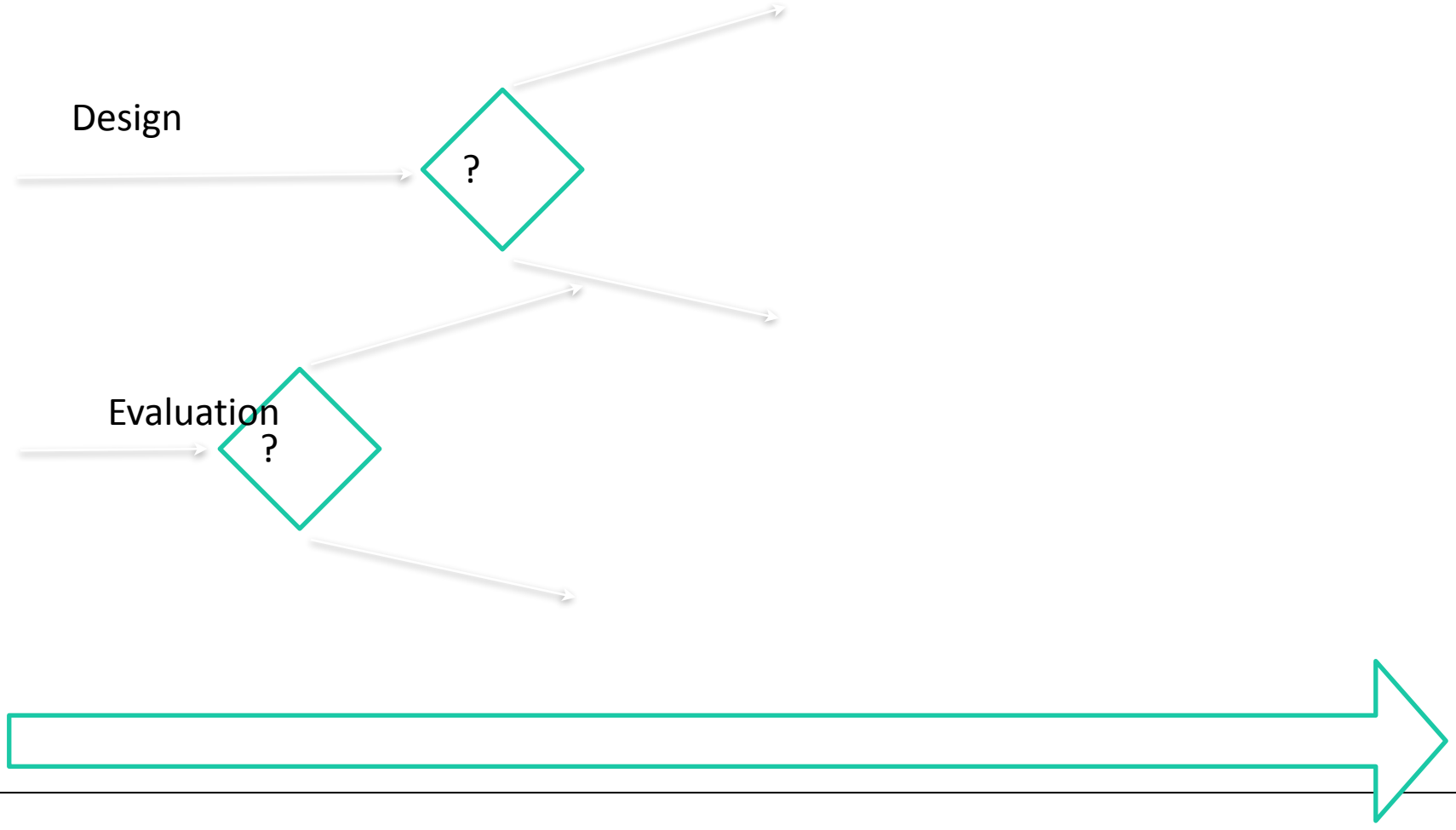
Discussion

Conclusion

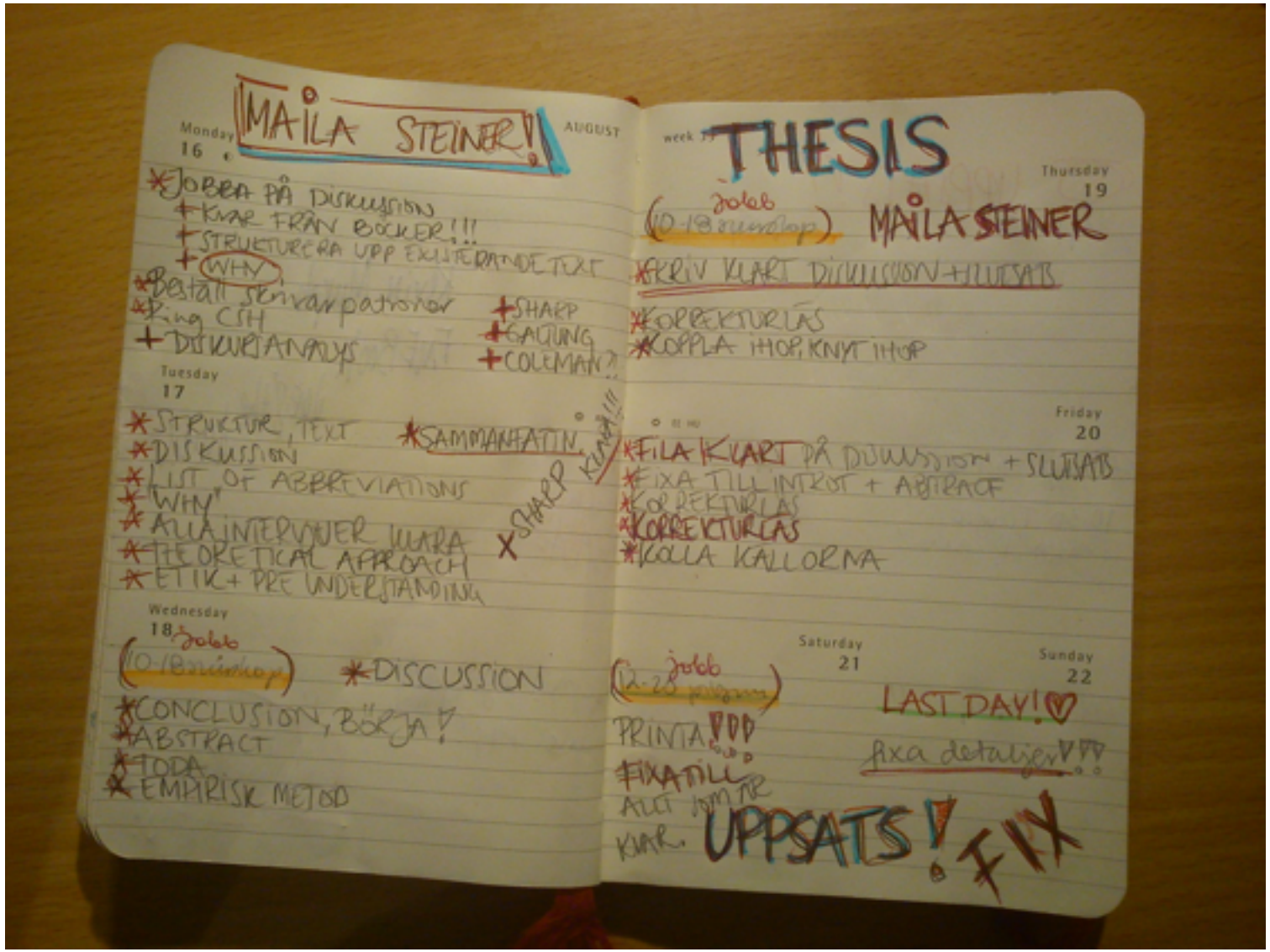
Thesis plan

	Subject	Software Eng.	Machine Learning	Games	...
Type					
Evaluation		X			
Design		X	X		
Improvement					

Time Plan



Diary


MAILA STEINER!
Monday 16
AUGUST
JOBBA PÅ DISKUSSION
KLAR FRÅN BÖCKER!!!
STRUKTURERA UPP EXISTERANDE TEXT
WHY
Beställ skrivarpatroner
Ring CSN
DISKURSANALYS
SHARP
GALLING
COLEMAN?
Tuesday 17
STRUKTUR, TEXT
SAMMANHÄTTA
DISKUSSION
LIST OF ABBREVIATIONS
"WHY"
ALLA INTERVJUER LUSKA
THEORETICAL APPROACH
ETIK + PRE UNDERSTANDING
SHARP
Wednesday 18
DISCUSSION
CONCLUSION, BÖRJA!
ABSTRACT
TODA
EMPIRISK METOD
week
THESIS
Thursday 19
MAILA STEINER
SKRIV KLART DISKUSSION + SLUTSATS
KORREKTURLÄS
KOPPLA IHOP, KNYT IHOP
Friday 20
FILA KLART PÅ DISKUSSION + SLUTSATS
FIXA TILL INTRO + ABSTRACT
KORREKTURLÄS
KORREKTURLÄS
KOLLA KÄLLORNA
Saturday 21
PRINTA!!!
FIXA TILL
ALLT SOM ÄR
KLAR.
Sunday 22
LAST DAY!
fixa detaljer
UPPSATS! FIX

A Great Thesis

I - The Problem

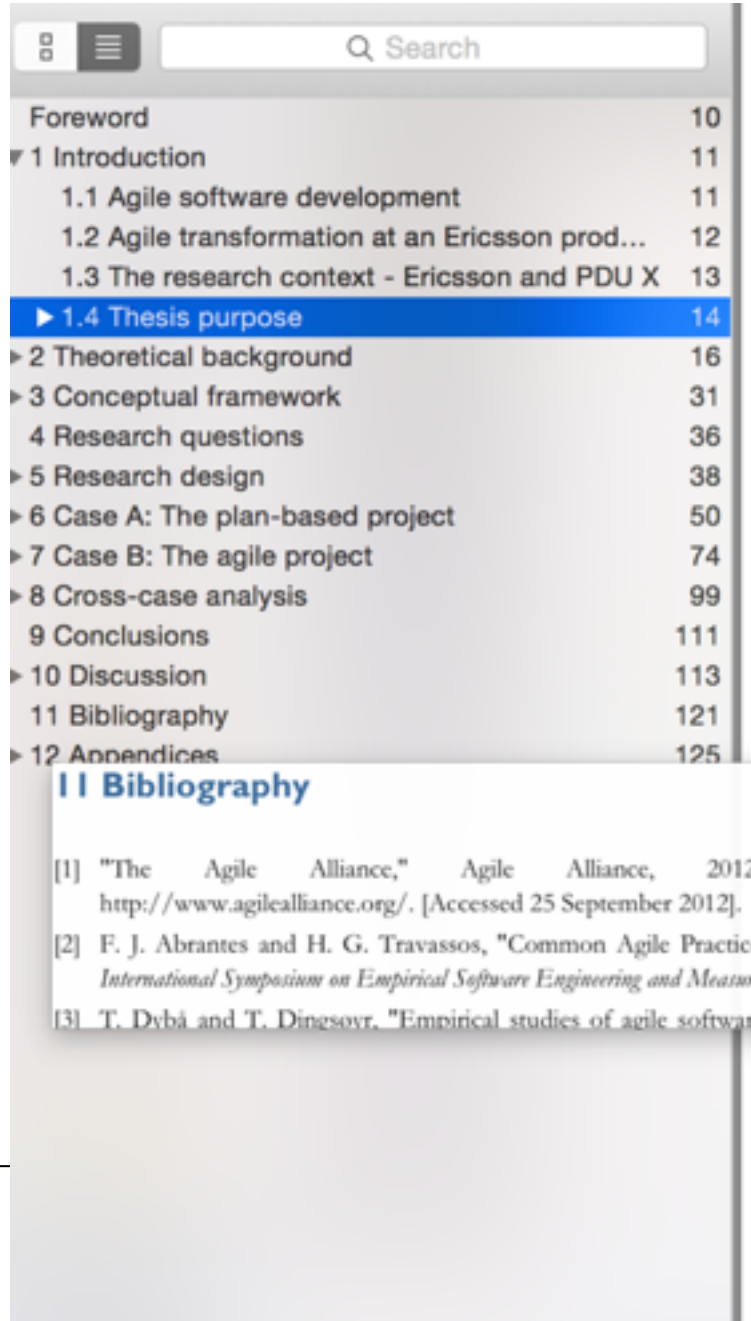
2 - the theory

An application of theory

Strong persuasion skills (aka a Method)

The language

Structure and format



11 Bibliography

[1] "The Agile Alliance," Agile Alliance, 2012. [Online]. http://www.agilealliance.org/. [Accessed 25 September 2012].

[2] F. J. Abrantes and H. G. Travassos, "Common Agile Practices in Software Pr
International Symposium on Empirical Software Engineering and Measurement, 2011.

[3] T. Dybå and T. Dingsøyr, "Empirical studies of agile software d

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The purpose of this thesis is thus to answer the question:

What impact does the use of agile principles and practices have on the large-scale software development projects Project A and Project B?

The purpose will be answered through a multiple-case study of Project A and Project B. The two projects are chosen because of the different extents to which they have adopted agile principles and practices. Project A is considered to represent a more traditional, plan-driven development process, with fewer implemented practices, while Project B represents a more agile approach with more implemented practices. The supposition is that the two projects, Project A and Project B, differ sufficiently in their approach to software development that the impact of agile software development will be possible to study by a comparison between the two projects.

1.4.1 Definition of agile principles and practices

Since PDU X follows the definition given by the Agile Alliance their definition is considered suitable also for this thesis. Thus we define:

- An agile software development *as* a software development that follows the values and principles stated in the Agile Manifesto.
- An agile software development method *as* a software development method that follows the values and principles behind the Agile Manifesto.
- The agile principles *as* the twelve principles stated in the Agile Manifesto
- An agile practice *as* a practice that implements the values and principles behind the Agile Manifesto.

2 Limitations

The focus of the thesis is on internal factors. This means that the design, implementation, integration and testing phases are the main phases under study, not the pre-study and requirement analysis nor the deployment, usability and acceptance testing or maintenance. In consequence there is a focus on how agile principles and practices have affected the efficiency of the development, not the externally focused partner of efficiency – effectiveness. Customer interactions and feedback are not investigated.

Ericsson is a huge company with many software development units. We will only study the agile practices and methods implemented in PDU X and only in the two chosen projects. However a discussion of the general applicability of the results to other projects inside Ericsson and even to other companies is made in chapter 10.

A great thesis:

An interesting problem

A convincing theory

A reliable method

A working solution

Established effects

Great presentation

But I will become a Master of Engineering, right?

Engineering vs research

	Engineering	Research
Rationale	Solve a problem	Gain understanding
Activities	Design, implement, verify	interviews, experiments, proofs, ...
Goal	Satisfied customers	New/shared understanding

Are they really that different?

In order to **solve a problem**, you need to **gain understanding** of the problem

In order to **verify** your implementation, you may need to do **experiments, interviews or proofs**

In order to have **satisfied customers**, you need to achieve a **shared understanding** that the problem has been solved appropriately

Thesis types

Thesis types

- **Evaluations** of new techniques or methods to improve existing products or processes
- **Design** of an application
- **Incremental** improvements of existing techniques of methods

Evaluation

General problem: Does the code quality deteriorate over time? How do we know?

Approach 1: Relate Git commits to code metrics such as cyclomatic complexity and draw a graph

Why is this not a good idea?

- We have not defined what we mean by ”code quality”, and hence, we have no way of knowing what to measure, or whether it relates to our desired quality.
- There is no clear sense of how to assess what we have done.

Approach 2

General problem: Does the code quality deteriorate over time? How do we know?

Approach 2: Based on interviews, we define code quality as *detected faults*. Determine whether detected faults correlate with cyclomatic complexity.

Why is this a better approach?

- We now have a definition of code quality
- The result can be assessed

Design

General problem: Create a new Foo application at our company

Approach 1: Read about the latest techniques that can be used on Wikipedia and on project sites, implement the system and ask the company supervisor if he/she is happy

Why is this not a good approach?

- We don’t know why the company wants the Foo application, how to evaluate it, or how long time it would take to implement it in full.
  - IF the requirements are not clear from the start, and the estimated time to implement the working, full solution is > 6 weeks, **do not aim for a full solution**

Approach 2

If the projected time to implement a full solution is > 6 weeks:

- Conduct a set of semi-structured interviews to understand the problem domain and the goal,
- a literature survey to understand solutions to similar problems,
- and a few structured iterations of development and documented customer feedback, to produce *a set of requirements* based on the initial prototypes.

Approach 3

If the projected time to implement a full solution is <= 6 weeks

- Determine functional and **non-functional requirements**,
- a literature survey to understand solutions to similar problems and **how to assess them**,
- develop the application iteratively, and **evaluate the resulting application** based on the non-functional requirements

Incremental improvement

General problem: We would like to perform testing of Telecom equipment with less hardware resources

Approach 1: Implement a booking system that automatically releases resources upon expired time slots.

Why is this not a good approach?

- We do not know how and why people use hardware resources, so we do not know how to optimize something.
- Is this a technical, an organizational problem or a cultural issue?
- How do we even measure utilization?

Approach 2

- Conduct an interview series to establish how different people perceive the problem
- Conduct an observational study to determine how people actually use resources
- Find a suitable model for resource utilization in the literature and apply it
- Measure utilization and relate to the results of the interviews

What's next?

Write a draft of your thesis plan by next Monday. Focus on the main topic, relate to previous courses, both the WHAT and the HOW.

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Summary

- Write a draft thesis & plan, prepare for and participate in seminars
- A great thesis is a marriage between solid engineering skills, genuine scientific approach to validate your work, and a crystal clear presentation.
- There are three main types of industry theses: evaluations, prototypes and improvements.