Session 4

A Syllabus for Usability Engineering in Multi-Project Courses

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Introduction

- While usability engineering (UE) gained high importance, software engineering classes promote developers design user interfaces [26]

> **Problem 1:** Students are barely able to apply usability engineering in real-world applications.

- Many UE concepts require well-defined environments or do not scale to the extend that they can be used by students in one semester

> **Problem 2:** Usability engineering concepts cannot easily be applied by students due to high setup efforts.

Hypothesis To enhance the effectiveness of teaching usability engineering, a well-aligned teaching concept and tool support is needed.

Introduction

Hypothesis To enhance the effectiveness of teaching usability engineering, a well-aligned teaching concept and tool support is needed.

- Requires a hands-on environment in which the teaching concept can be applied in a **practical manner over a longer timeframe**

💡 Cross-Functional Teams [4]

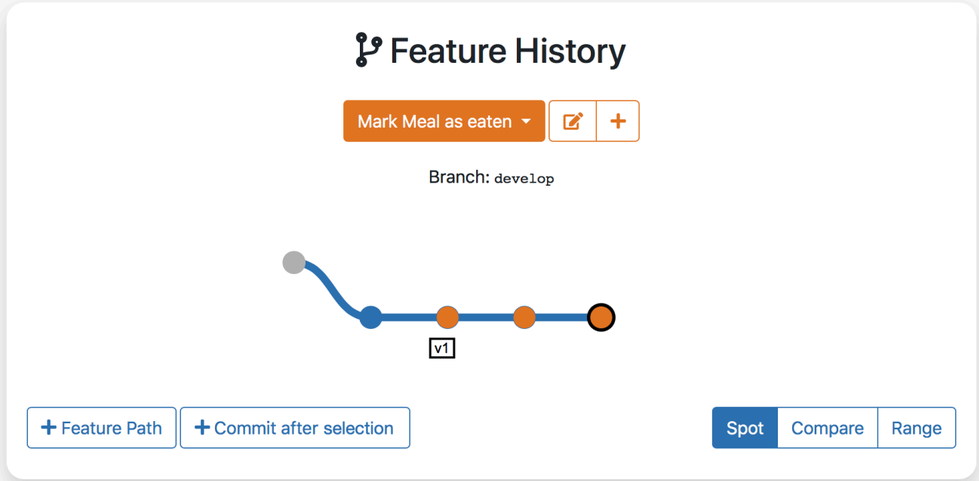
💡 iPraktikum [4, 15, 31]

- **Teaching concept**, i.e., a syllabus, should allow knowledge transfer
- The syllabus needs to incorporate a **usability engineering platform**

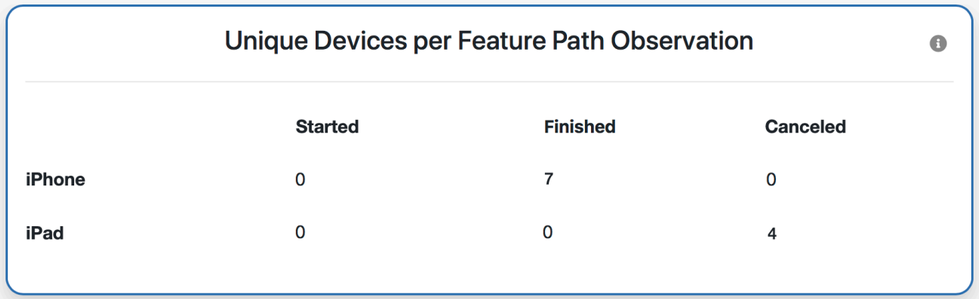
💡 Cuu [12]

The Cuu Platform

- Supports developers in **understanding user** (behavior) in rapid engineering processes through visualization [13]
- Focuses on development on **feature branches**
- Enables the use and analysis of **feature crumbs** [14] in code



Springboard to select knowledge [13]



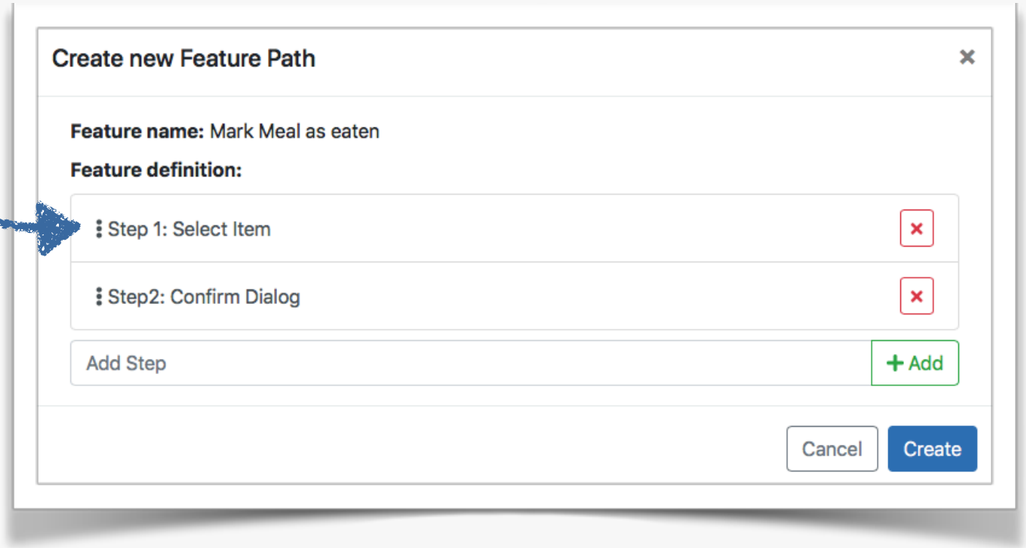
Widget to present knowledge [13]

Feature Crumbs

- A **lightweight, code-based** concept to specify a feature's **run-time characteristics** [14]

```
@IBAction func didTapTryFeatureKitButton(_ sender: UIButton) {
        // Notify the FeatureKit component of CUU that a step of a feature was triggered.
        CUU.seed(name: "Step 1: Select Item" )
    }
```

- **Cuu** concatenates multiple crumbs via a web interface
- The concatenation of crumbs is called a **feature path**

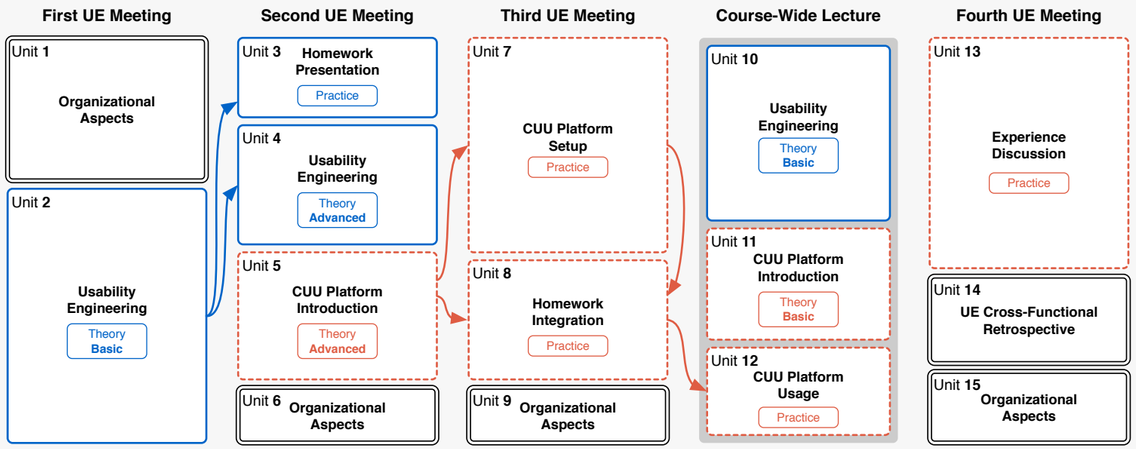


💡 This can be understood as the collection of steps that form a scenario.

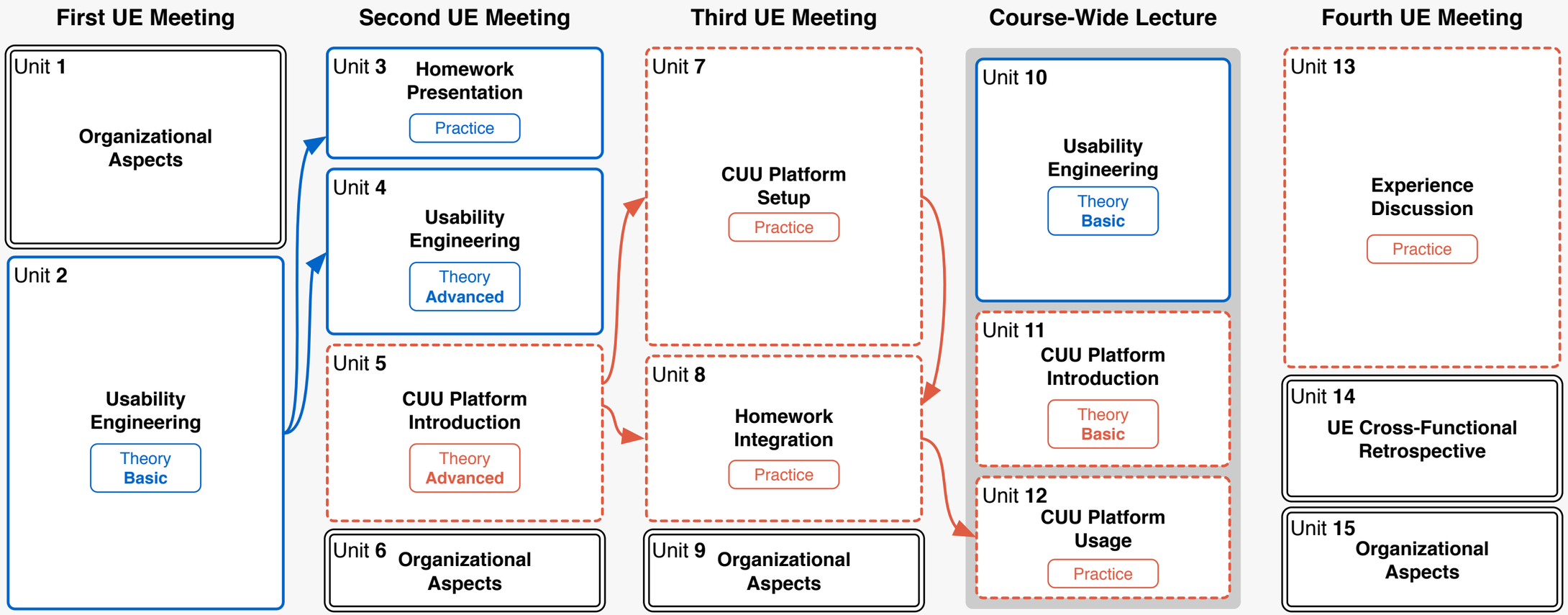
The UE4MP Syllabus

*Usability Engineering (**UE**) **for** multi-project (**MP**)* courses

- **Relies on step-wise introduction** of important concepts
- **Reduce theory parts** in favor of practical elements over time
- **Prepares course-wide lecture** with all team members

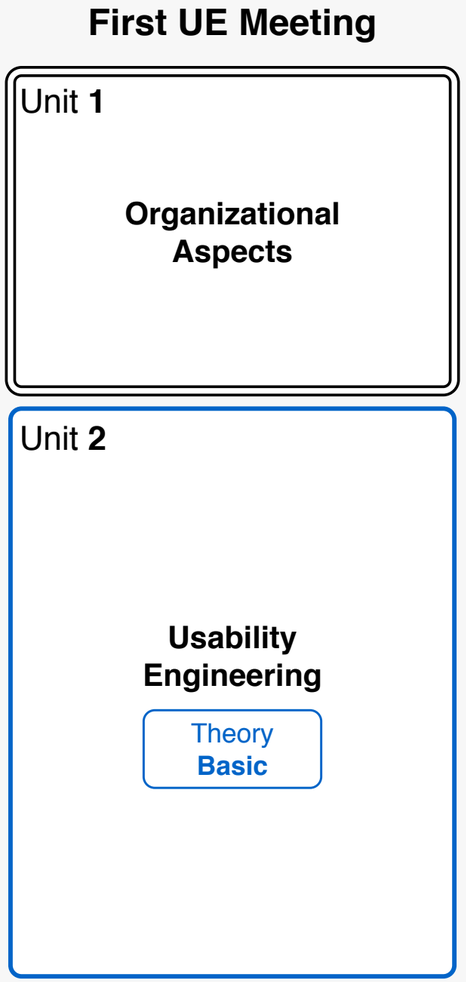


The UE4MP Syllabus



First UE Meeting

- UE managers share **overview** of their projects to enable feedback by others
- Introduction to **responsibilities** of a UE manager
- **Focus on theory**: Usability Engineering by Jakob Nielsen [18]
- **Interactive presentation** by UE coaches
  - Usability slogans, usability engineering lifecycle, usability heuristics, discount usability engineering, …
- Introduction to **Homework 1**
  - Every UE manager should illustrate one usability heuristic within their application; prepare 2min talk



- UE manage
  enable feed
- Introduction
- **Focus on th**
  Jakob Niels
- **Interactive**
  - Usability s
    usability h
- Introduction
  - Every UE
    heuristic w

Usability Heuristics

Created by Jan Johanßen just a moment ago

- All mentioned heuristics are from the book "Usability Engineering" by Jakob Nielsen
  - You can either access it via the library → http://proquest.tech.safaribooksonline.de/9780125184069 using eAccess (for help, see instructions below)
  - There are also multiple copies of the book available in the library
  - Further, there is Nielsen's Blog (https://www.nngroup.com/articles/). If you spot a related article there, add it as a link to the further reading column
- 10 (+1) usability heuristics / 9 teams → Pick one topic by adding your team's name

How to use eAcces

1. Log in on https://login.eaccess.ub.tum.de/ using your TUM credentials
2. Visit http://proquest.tech.safaribooksonline.de.eaccess.ub.tum.de/9780125184069

Heuristic	Further Reading	Brief Summary	Team Name	Positive/Negative Example Related to Your App
Expected Format	Link	Using Bullet points	Team Name	Screenshot / Mockup / Animated GIF / Brief anecdote
...	...	...	...	...

Help and Documentation	Error message guidelines
	
	Documentation usability
	
	Bad documentation examples
		It is important to have easy to use interfaces. But often it is hard to do that for complex systems. So users should also have a well-structured help section. Users usually don't read help section but just rush through the application and only open manuals when they have problems.
		• Error messages should help the user figure out what is wrong and what to do about it
		  • Avoid error codes in error messages
		• Make it easy to find suitable help information
		  • Structured help pages with clear navigation
		  • Search in help pages
		  • Icons/buttons to quickly look up help for functionality/UI element from the current context
		• Introductory tutorials and guides for new users
			Team ABC
			@Jan Johanßen
				

First UE Meeting

Unit 1

Organizational Aspects

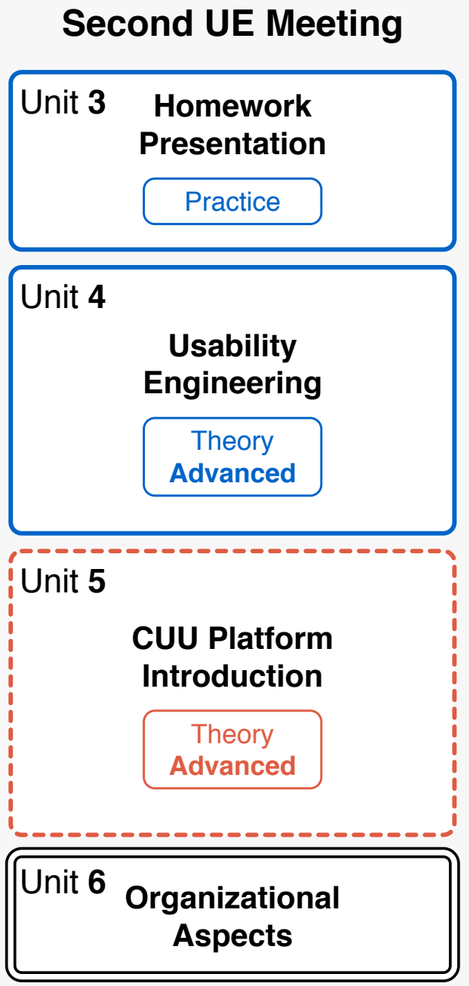
Unit 2

Usability Engineering

Theory Basic

Second UE Meeting

- Homework presentation facilitated by UE instructor
- **Advanced theory** session, with a focus on concepts that are important for using the platform
  - Scenarios as an instrument for usability engineering [19]
  - Open discussion about feature definitions
  - Common usability testing practices
- Introduction to **Cuu platform**
  - Theory, feature crumbs, align goals with UE theory
- Introduction to **Homework 2**
  - Preparing a template for crumbs and feature path



Feature Crumbs Templates

Created by Jan Johanßen, last modified 10 minutes ago

1. Define a flow of events on the Confluence page

Description text 1

Scenario Name	<Scenario1 Name>	**Description**	**Scope in Code**
Flow of Events	<Crumb1 Name>	The user taps on the "try feature" button	Triggered by an IBAction linked to the button
	<Crumb2 Name>	The user reads the presented article	Triggered by the UIScrollview and recognized by the UIScrollviewDelegate's *scrollViewDidScroll*
	<CrumbX Name>	...	... (Be creative on what interactions could be used to trigger Feature Crumbs! 🙂)

2. Add feature crumbs as templates to your project

Description text 2

UIViewController triggering Crumb Tracking

```
class ViewController: UIViewController {

    @IBAction func didTapTryFeatureKitButton(_ sender: UIButton) {

        print("Your Application Logic")
        // Feature Crumb Name: "<Crumb1 Name>"

    }
}
```

3. Prepare JSON snippet on the Confluence page with the flow of events

Description text 3

JSON Feature Representation

```
[
    {
        "step":1,
        "crumbName":"<Crumb1 Name>",
        "crumbType":"action"
    }
]
```

Second UE Meeting

Unit 3 Homework Presentation
Practice

Unit 4 Usability Engineering
Theory
Advanced

Unit 5 CUU Platform Introduction
Theory
Advanced

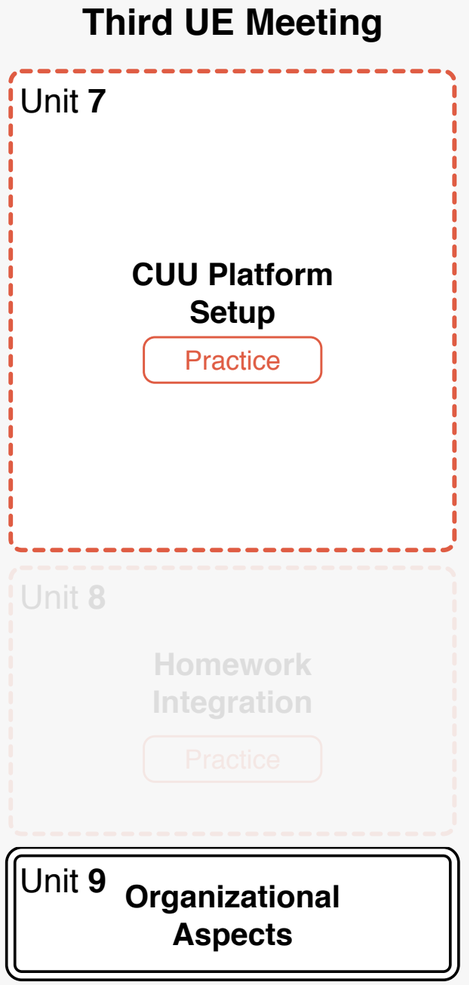
Unit 6 Organizational Aspects

Third UE Meeting

- **Hands-on meeting** to enable use of the platform
  - Incremental presentation and implementation of steps
- **Re-visit Homework 2** and setup their prepared feature for analysis with the **Cuu** platform
  - Serves as the basis for the upcoming course-wide lecture in which all team members can then get to know how they can use the **Cuu** platform

Fourth UE Meeting

- Stimulate discussions
- Retrospective meeting



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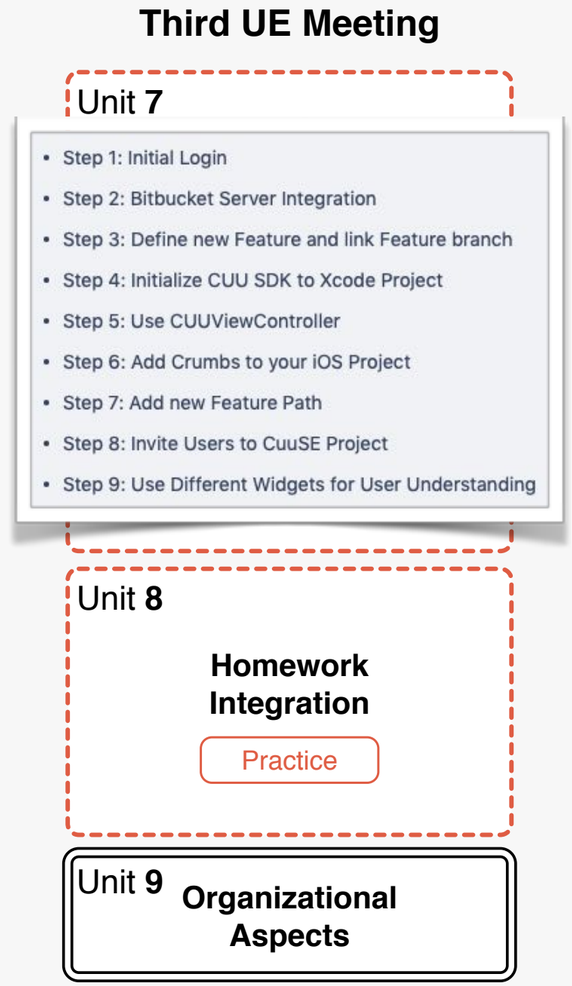

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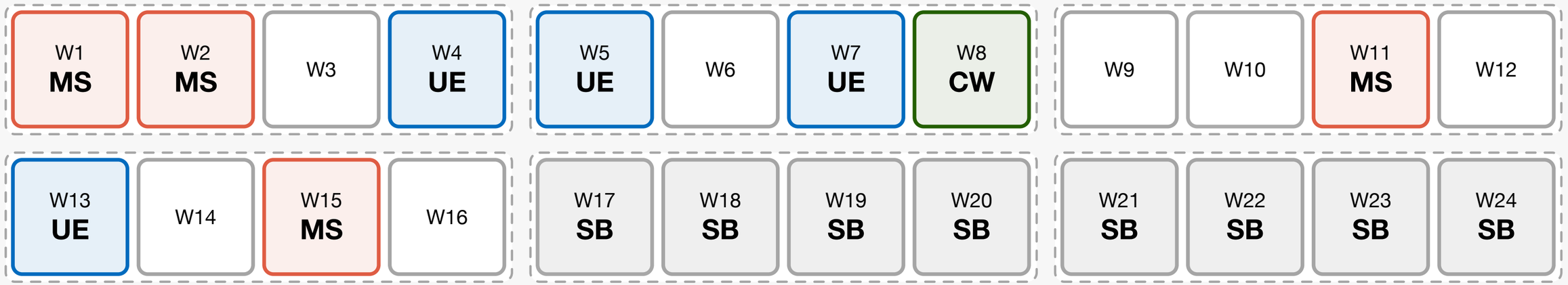
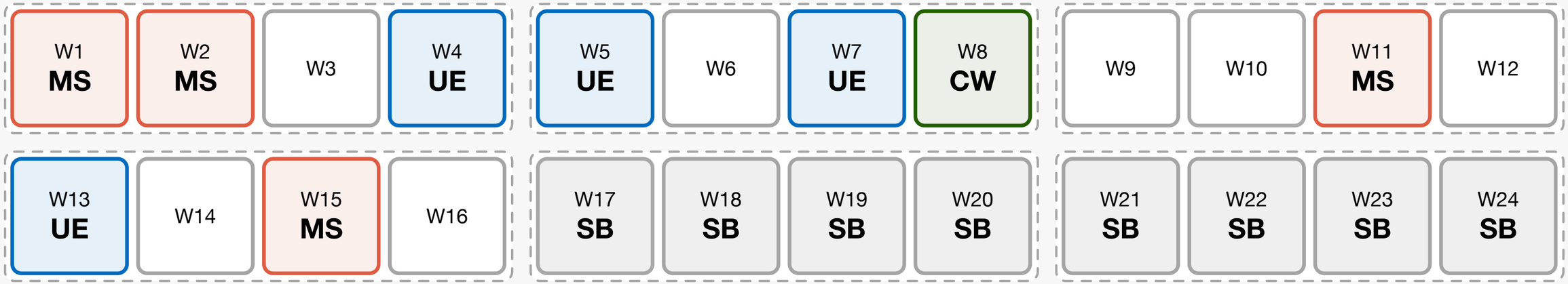
Experience Report: Temporal Instantiation



MS ⇢ Milestone **UE** ⇢ Usability Engineering **CW** ⇢ Course-Wide Lecture **SB** ⇢ Semester Break

Experience Report: Temporal Instantiation

Discussion

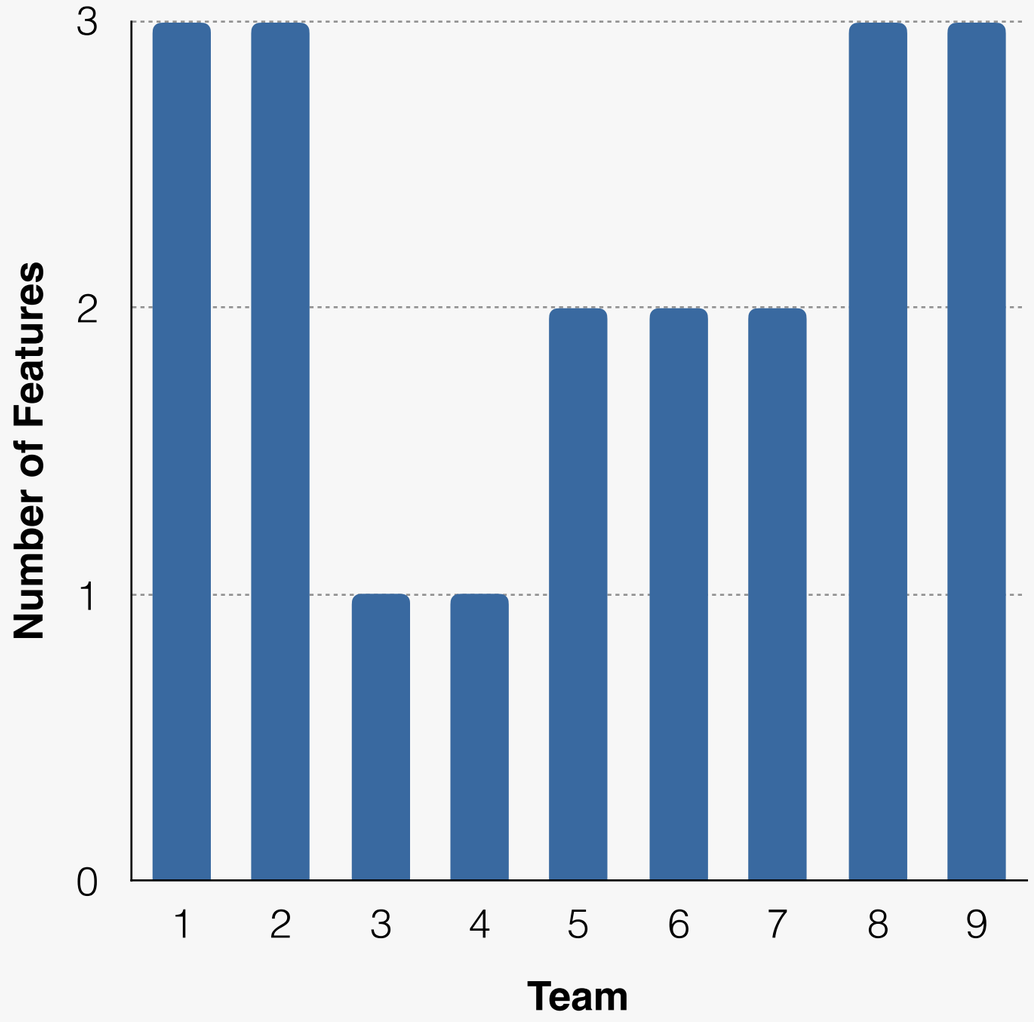


MS ⇢ Milestone **UE** ⇢ Usability Engineering **CW** ⇢ Course-Wide Lecture **SB** ⇢ Semester Break

Synchronizing Efforts

- **Communication** and **four UE meetings** throughout the semester
- **Development progress** in line with UE meeting content
- **Collaboration** with other cross-functional teams

Experience Report: Platform Usage



- Eight features were added over the course of the semester
- Combination of UE4MP and tool support **enabled usability engineering** in real-world apps

2.200 features completed

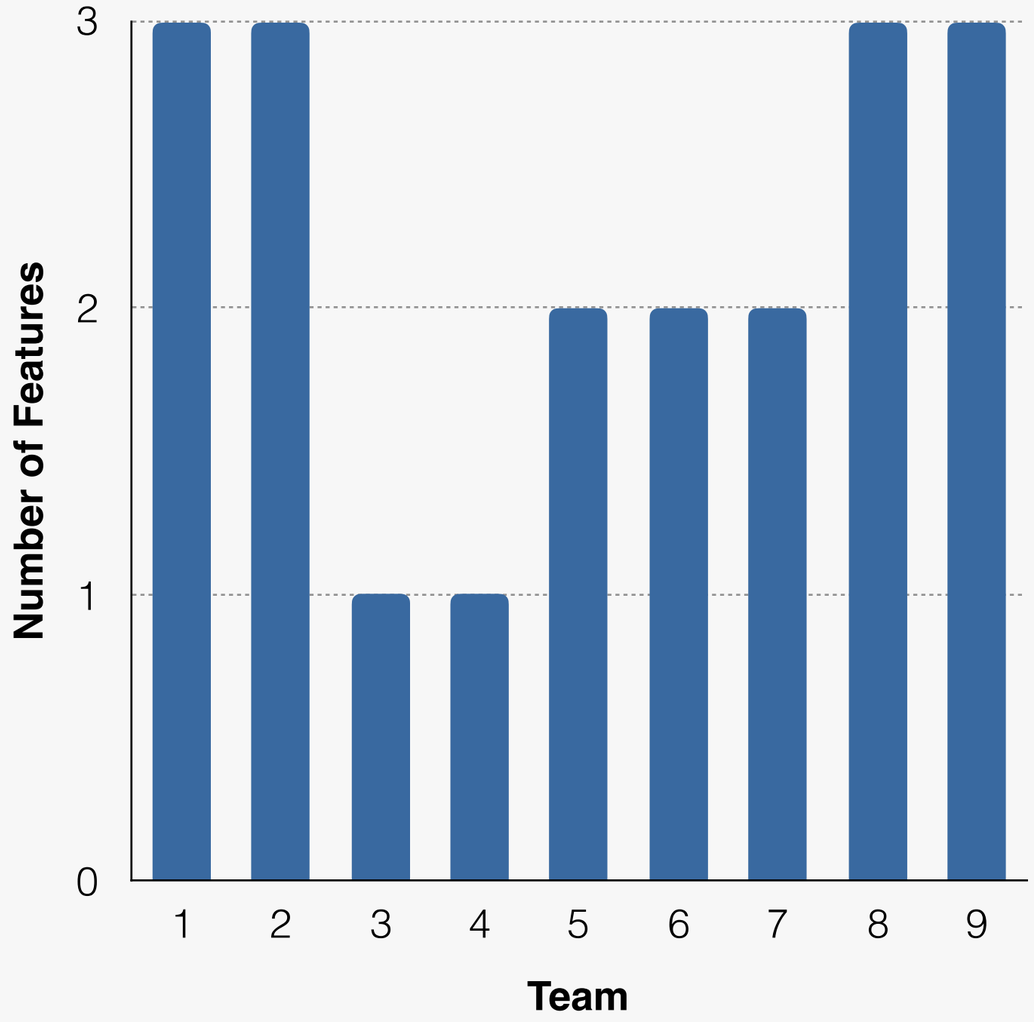
850 features in progress

1.500 features canceled

6.500 feature crumbs triggered

Experience Report: Platform Usage

Discussion



The Effect of Tool Support

- Enables usability engineering
- Teams reduce usage after initial phase of using the platform

Reasons might be:

⇢ Other (development) tasks

⇢ Challenge in designing features

Experience Report: Practical Unit Results

Team	Number of Crumbs	Feature Path Correct?	Feature Meaningful?
1	3	Yes	Yes
2	12	Yes	Yes
3	3	Yes	No
4	14	No	No
5	3	Yes	Yes
6	3	Yes	Yes
	6	Yes	Yes
	6	Yes	Yes
7	6	Yes	Yes
8	3	Yes	Yes
	2	Yes	Yes
9	3	Yes	Yes

- Result of Homework 2
- Every team **successfully** defined feature crumbs
- Most teams were able to define a **correct feature path**
- For two teams it was a challenge to define a **meaningful feature**

Experience Report: Practical Unit Results

Discussion

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	2	Yes	Yes
9	3	Yes	Yes

Usability Engineering is Difficult

- Adopting usability heuristics to own application (Homework 1)
- Creating a well-defined feature representation (Homework 2)

⇢ Strengthens the need for tool-support **and** UE4MP syllabus

Further Discussion Points

Discussion

- **Enable Collaboration**
  - A dedicated instant messaging channel to discuss UE-related aspects fosters the creative process between students
  - A wiki page can serve as a central knowledge repository
- **Acknowledging Privacy Aspects of Users**
  - Sensitize students for collecting and using interaction data
  - Raise their responsibility
- **Providing the Environment**
  - UE4MP syllabus requires different tools (issue management, wiki, …)
  - Only feasible for large-scaled project courses

Conclusion & Future Work

- **Introduction of UE4MP syllabus**
  - Teaching concept for usability engineering based on four meetings
  - Based on cross-functional project teams
  - Incorporates the Cuu platform for usability engineering
- **Experience report** from using UE4MP in the iPraktikum
  - Syllabus can be applied for teaching usability engineering
  - Efforts required to introduce and foster usage of platform
- **Future work**
  - Improve UE4MP syllabus, e.g., replace the 4th meeting with 1:1 meetings
  - Improve usability of the Cuu platform

References

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Thank you for your attention!

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