

Final exam 23-01-2024

2IMP40 Empirical Methods in Software Engineering 23/24 · 4 exercises · 100.0 points

1 Part 1

20.0 points · 5 questions

The first part of the exam consists of **five** multiple-choice questions. Each question has four answer options, and exactly one is correct. Each correctly answered question gives four points.

Text

a Jiang et al. (2017) investigate why and how developers fork what from whom, using a collection of GitHub repositories involving over 236,000 developers and over 1.8m forks. This study can be classified as

4.0 points · Multiple choice · 4 alternatives

- | | |
|---|-----|
| <input type="radio"/> A field experiment | 0.0 |
| <input type="radio"/> A field study | 0.0 |
| <input type="radio"/> A judgement study | 0.0 |
| <input checked="" type="radio"/> A sample study | 4.0 |

Feedback

Feedback when the question is answered correctly

Feedback when the question is answered partially correctly

Feedback when the question is answered incorrectly

b Please consider the below abstract and indicate what type of design science contribution this paper is.

How can organizational factors such as structure and culture have an impact on the working conditions of developers? This study is based on ten months of observation of an in-house software development project within a large telecommunications company. The observation was conducted during mandatory weekly status meetings, where technical and managerial issues were raised and discussed. Preliminary results show that many decisions made under the pressure of certain organizational factors negatively affected software quality. This paper describes cases depicting the complexity of organizational factors and reports on ten issues that have had a negative impact on quality.

4.0 points · Multiple choice · 4 alternatives

- | | | |
|----------------------------------|---------------------|-----|
| <input type="radio"/> | Problem Solution | 0.0 |
| <input checked="" type="radio"/> | Descriptive | 4.0 |
| <input type="radio"/> | Solution Validation | 0.0 |
| <input type="radio"/> | Solution Design | 0.0 |

Feedback

Feedback when the question is answered correctly

Feedback when the question is answered partially correctly

Feedback when the question is answered incorrectly

c What variable does one model as a random effect?

4.0 points · Multiple choice · 4 alternatives

- | | |
|---|-----|
| <input type="radio"/> Dependent variables | 0.0 |
| <input type="radio"/> Parameters | 0.0 |
| <input type="radio"/> Independent variables | 0.0 |
| <input checked="" type="radio"/> Blocking variables | 4.0 |

Feedback

Feedback when the question is answered correctly

Feedback when the question is answered partially correctly

Feedback when the question is answered incorrectly

d In a Constructivist worldview the Positivistic notion of Internal Validity is often translated to:

4.0 points · Multiple choice · 4 alternatives

- | | |
|--|-----|
| <input type="radio"/> Confirmability | 0.0 |
| <input checked="" type="radio"/> Credibility | 4.0 |
| <input type="radio"/> Dependability | 0.0 |
| <input type="radio"/> Transferability | 0.0 |

Feedback

Feedback when the question is answered correctly

Feedback when the question is answered partially correctly

Feedback when the question is answered incorrectly

e Select the right clause to complete the sentence below:

Enriching data from software repositories ...

4.0 points · Multiple choice · 4 alternatives

- can be done using automated tools provided the tools' results are validated. 4.0
- is essential to make the repository data amenable for qualitative analysis. 0.0
- requires systematic random sampling. 0.0
- is necessary to address the mono-method bias. 0.0

Feedback

Feedback when the question is answered correctly

Feedback when the question is answered partially correctly

Feedback when the question is answered incorrectly

2 Part 2

40.0 points · 5 questions

The text included below summarizes an introduction to a recent empirical paper. This summary concludes with a research question. For this part of the exam, we ask you to sketch an empirical study that answers the listed research question. For scoping you can assume that this study will be conducted as part of a master thesis graduation project (30 ECTS). This part is divided into several sub-questions. In particular, we ask you to sketch several alternative study designs for the same research question and discuss the differences between these designs.

Context and Research Question: *The challenges experienced by people at the intersection of multiple diversity aspects (e.g., age and gender) cannot be merely reduced to the combination of experiences associated with each one of the diversity aspects in isolation. For example, the experiences of Black women differ from those of Black men and of non-Black women. In fact, Black women do not necessarily know whether their negative experiences should be attributed to their gender or their race. In our study, we looked at the experiences and survival strategies of people working in the software industry whose gender and age are marginalized, asking:*

RQ: *What age- and gender-specific experiences have veteran software developers of marginalized genders had in their careers?*

Based on the above context you should describe three different data collection procedures: a study using **Mining Software Repositories**, **Interviews**, and a **Survey**. For each of the three, you should discuss the data you plan to collect, where and/or how you plan to collect it (sampling) and sketch the instruments you plan to use. While describing the three different studies you should try to be as specific as possible.

Text

a Describe the data-collection of a study that answers the research-question using **Mining Software Repositories**.

8.0 points · Open · 3/5 Page

+4 points

Sampling -- Full Points: The answer clearly describes what sampling strategy will be used, it is tailored towards the setting of the research question, and motivates why the sampling is appropriate given the setting.

+2 points

Sampling -- Half points: Two of the three criteria are met.

0 points

Sampling -- No Points: One or less than the criteria are met.

+4 points

Repository Mining -- Full Points: The answer sketches what data and how will be mined to answer the RQs. The answer aligns with the described sampling technique, sketches what information will be extracted, operationalizes constructs, and conforms to best repository mining practices.

+2 points

Repository Mining -- Half Points: Two of the four criteria are met.

0 points

Repository Mining -- No points: One or less than the criteria are met.

b Describe the data-collection of a study that answers the research-question using **Interviews**.

8.0 points · Open · 3/5 Page

+4 points

Sampling -- Full Points: The answer clearly describes what sampling strategy will be used, it is tailored towards the setting of the research question, and motivates why the sampling is appropriate given the setting.

+2 points

Sampling -- Half points: Two of the three criteria are met.

0 points

Sampling -- No Points: One or less than the criteria are met.

+4 points

Interviews -- Full Points: The answer sketches what interviews will be conducted to answer the RQs. The answer aligns with the described sampling technique, sketches what questions will be asked, operationalizes constructs, and conforms to best interview practices.

+2 points

Interviews -- Half Points: Two of the four criteria are met.

0 points

Interviews -- No points: One or less than the criteria are met.

c Describe the data-collection of a study that answers the research-question using a **Survey**.

8.0 points · Open · 3/5 Page

+4 points

Sampling -- Full Points: The answer clearly describes what sampling strategy will be used, it is tailored towards the setting of the research question, and motivates why the sampling is appropriate given the setting.

+2 points

Sampling -- Half points: Two of the three criteria are met.

0 points

Sampling -- No Points: One or less than the criteria are met.

+4 points

Survey -- Full Points: The answer sketches what survey will be conducted to answer the RQs. The answer aligns with the described sampling technique, sketches what questions will be asked, operationalizes constructs, and conforms to best practices on conducting surveys.

+2 points

Survey -- Half Points: Two of the four criteria are met.

0 points

Survey -- No points: One or less than the criteria are met.

d You have described three alternative data collection procedures (2a), (2b), and (2c). List the unique advantages and challenges associated with each data collection procedure.

8.0 points · Open · 9/20 Page

+1.34 points

Advantages of the **repository mining** approach are correctly identified.

+1.33 points

Challenges of the **repository mining** approach are correctly identified.

+1.33 points

Advantages of the **interviews** are correctly identified.

+1.34 points

Challenges of the **interviews** are correctly identified.

+1.33 points

Advantages of the **surveys** are correctly identified.

+1.33 points

Challenges of the **surveys** are correctly identified.

e Pick one data collection procedure, and argue why, based on the advantages and challenges of each procedure, you believe it is the most appropriate research procedure for the listed research question.

8.0 points · Open · 9/20 Page

+4 points

The argument for the most appropriate procedure refers to advantages and challenges listed in 2d).

+4 points

The argument is valid (i.e., does not contain logical flaws).

3 Part 3

40.0 points · 6 questions

For the third part we ask you to read the accompanying paper. Please read the paper and come-up with two viable and distinct threats to validity. For each threat to validity please use the answer fields below to describe and classify it. The threats you describe should describe **two different types of threats to validity** (So if the first threat to validity you describe belongs to the category external, the second threat you describe cannot belong to the category external).

You should describe your first threat to validity in 3.a, describe the conclusion it invalidates in 3.b and classify it in 3.c, and you should describe your second threat to validity in 3.d, describe the conclusion it invalidates in 3.e and classify it in 3.f.

Text

a Describe your first threat to validity.

9.0 points · Open · 7/20 Page

+9 points

The answer describes a threat to validity that could indeed threaten the validity of the study

+4 points

The answer describes a potentially viable threat to validity. However, the description is too vague, or is not correctly argued.

b Describe the findings of the paper that would be invalidated by the threat to validity, and describe how these findings would be invalidated.

9.0 points · Open · 9/20 Page

+9 points

The answer points to a specific conclusion of the study that might be impacted by the threat to validity.

+4 points

The conclusion might not be fully impacted by the threat, or the description of the conclusion that is impacted is too vague.

c Classify the above threat using the model of Wohlin et al.

2.0 points · Multiple choice · 4 alternatives

- | | |
|--|-----|
| <input checked="" type="radio"/> Conclusion validity | 2.0 |
| <input type="radio"/> Construct validity | 2.0 |
| <input type="radio"/> External validity | 2.0 |
| <input type="radio"/> Internal validity | 2.0 |

Feedback

Feedback when the question is answered correctly

Feedback when the question is answered partially correctly

Feedback when the question is answered incorrectly

d Describe your second threat to validity.

9.0 points · Open · 7/20 Page

+9 points

The answer describes a threat to validity that could indeed threaten the validity of the study

+4 points

The answer describes a potentially viable threat to validity. However, the description is too vague, or is not correctly argued.

e Describe the findings of the paper that would be invalidated by the threat to validity, and describe how these findings would be invalidated.

9.0 points · Open · 9/20 Page

+9 points

The answer points to a specific conclusion of the study that might be impacted by the threat to validity.

+4 points

The conclusion might not be fully impacted by the threat, or the description of the conclusion that is impacted is too vague.

f Classify your second threat using the model of Wohlin et al.

2.0 points · Multiple choice · 4 alternatives

- Conclusion validity 2.0
- Construct validity 2.0
- External validity 2.0
- Internal validity 2.0

Feedback

Feedback when the question is answered correctly

Feedback when the question is answered partially correctly

Feedback when the question is answered incorrectly

4 Extra Space

0.0 points · 1 question

Extra space. Please clearly indicate to what question your answer belongs.

Open · 2 4/5 Page