# Planning

## Define the need

1 - Motivate the need and relevance

[Formal Methods: Use and Relevance for the Development of Safety-Critical Systems L. M. BARROCA1 AND J. A. McDERMID2 \*]

https://homepage.cs.uiowa.edu/~fleck/role.html#:~:text=The%20role%20of%20formal%20methods&text=This%20helps%20us%20to%20avoid,consistency%20among%20many%20related%20activities.

## Define the review protocol

1 - Define objectives and questions

A systematic mapping study on the verification of intelligent systems with formal methods.

Goal: The main goal of this work is to plan and carry out a systematic mapping study to summarize the state-of-the-art on the verification of intelligent systems based on formal methods.

Questions:

* What formal approaches are used (or most common) in the verification of intelligent systems?
* What are the benefits of using formal methods based techniques in the verification of intelligent systems?
* What are the challenges of verification?

Additional questions:

* Does the number of studies about the use of formal methods in verification increase over the years?

Results or conclusions:

* What are the trends for the future?

2 - Consult target audience to define questions

Pedir ajuda ao professor

3 - Follow guidelines, advices

[Identifying, categorizing and mitigating threats to validity in software engineering secondary studies. AMPATZOGLOU]

[B. Kitchenham , P. Bereton , A systematic review of systematic review process re- search in software engineering, Inf. Softw. Technol. 55 (12) (2013) 2049–2075 .]

<https://www.sciencedirect.com/science/article/abs/pii/S0950584913001560>

## Protocol review

### 1- Independent experts review protocol

### 2 - Experienced researches review protocol

### 3 - Do pilot review

Conducting

Identification of Research

1 - Generate Search Strategy

[B.A. Kitchenham , S. Charters , Guidelines For Performing Systematic Literature Re- views in Software Engineering, School of Computer Science and Mathematics, Keele University., 2007 Technical Report EBSE-2007-01]

<https://legacyfileshare.elsevier.com/promis_misc/525444systematicreviewsguide.pdf>

[Guidelines for conducting systematic mapping studies in software engineering: An update

Author links open overlay panel. Kai Petersen, Sairam Vakkalanka, Ludwik Kuzniarz]

<https://www.sciencedirect.com/science/article/pii/S0950584915000646>

1. Trial search

Search in ACM database

Verification AND intelligent systems AND formal methods

Resultado: 26,785

1. Review of results

Ver reunião do dia 06/09

1. Expert Consultation
2. Know Database search
3. Snowballing

A técnica já foi indicada pelo professor e será utilizada

1. Manual/automatic search

Busca manual primária, não sistemática

2 - Bibliography Management

Usarei uma planilha para organizar os artigos.

3 - Document the search

Utilizarei um doc para documentar as descobertas

4 - Develop the Search

1. PICO
2. Consult experts
3. Iterative search/ phase search
4. Keywords from papers
5. Use standards
6. Snowballing
7. Pilot search
8. Search in abstract/title/keywords

5 - Evaluate search

1. Test Set
2. Expert evaluation
3. Authors’ web page

6 - Publication Bias

1. Scan grey literature
2. Include conference proc.
3. Search for unpolished work

Study Selection

1 - Study Selection Criteria

1. Avoid language based exclusion
2. Blind review
3. Define criteria
4. Resolve disagreements
5. Decision rules

2 - Study Selection Process

1. Maintain lists
2. Multi-stage process

3 - Reliability of Inclusion Criteria

1. Sensitivity analyses
2. Discuss disagreements
3. Acess Kappa statistic

Study Quality Assessment

1 - Quality thresholds

2 - Quality instruments

1. CRD guidelines
2. Internal/external bias assessment

3 - Limitations of assessment

Data extraction

1- Data Extraction forms

1. Use topic-independent schemas
2. Use topic-specifics schemas

2 - Data Collection forms

3 - Extraction procedure

1. Identify objective criteria
2. Involve >2 researchers
3. Check inconsistencies
4. Remove obscuring information
5. Keywording using abstracts

4 - Handle publication on same data

1. Remove duplicates

5 - Handle missing data

1. Include quality information
2. Sensitivity analyses for data further manipulated

Data Synthesis

1 - Synthesis method

1. …

2 - Presentation of Results

3 - Sensitivity Analysis

4 - Publication bias

1. Funnel plots

Reporting

Report Structure

1 - Use specific structure

Peer Review

1- Inclusion/exclusion criteria

1. Report rules
2. Report rules applications
3. Report number of remaining papers

2-Search process

1. Report search mechanism
2. Report time period of search

3 - Quality assessment

1. Report threats

4 - Report Synthesis method

1. Report checklist
2. Report disagreement resolved

5 - Provided guidelines outcomes

1. Repost strength of evidence
2. Use diagrams

# Checklist for threats to validity identification and mitigation

Study Selection Validity

TV 1 : Has your search process adequately identified all relevant primary studies?

MA 1 : Have you used snowballing? (P)

MA 2 : Have you performed pilot searches to train your search string? (P)

MA 3 : Have you selected the most-known DLs or have you made a selection of specific publication venues or used broad search engines or indices ( based on the goal of your study )? (P)

MA 4 : Have you compared your list of primary studies to a gold standard or to other secondary studies? (C)

MA 5 : Have you used a broad search process in generic search engines or indices (e.g., Google Scholar) so that you ensure the identification of all relevant publication venues? (P) MA 6 : Have you used a specific strategy for systematic search string construction? (P)

MA 7 : Has an independent expert reviewed the search process? (P)

MA 8 : Have you used tools to facilitate the search process? (P)

MA 9 : Have you evaluated the search results and documented the search outcomes? (P)

TV 2 : Were primary studies relevant to the topic of the review published in several different journals and conferences?

MA 1 : Have you used a broad search process in generic search engines or indices (e.g., Google Scholar) so that you ensure the identification of all relevant publication venues? (P)

TV 3 : Have you identified primary studies in multiple languages?

MA 1 : Is the number of such studies expected to be high compared to the population? (C)

TV 4 : Were the full texts of all identified primary studies accessible from the researchers? MA 1 : Is the number of studies with missing full texts expected to be high compared to the population? (C)

TV 5 : Have you managed duplicate articles?

MA 1 : Have you developed a consistent strategy (e.g., keep the newer one or keep the journal version) for selecting which study should be retained in the list of primary studies? (P)

MA 2 : Have you used summaries of candidate primary studies to guarantee the correct identification of all duplicate articles? (P)

TV 6 : Have you included/excluded grey literature?

MA 1 : Does your decision to include or exclude the grey literature comply with the goals of the study and the availability of sources on the subject? (C)

TV 7 : Have you adequately performed study inclusion/exclusion?

MA 1 : Have you used systematic voting? (P)

MA 2 : Have you performed a random screening of articles among all authors? (P)

MA 3 : Have researchers discussed the inclusion or exclusion of selected articles in case of conflict? (P)

MA 4 : Have the inclusion exclusion criteria been documented explicitly in the protocol? (P) MA 5 : Have the authors discussed the inclusion/exclusion criteria and revised them after pilot iterations, or by experts’ suggestions after review? (P)

MA 6 : Have you prescribed a set of decision rules for study inclusion/exclusion? (P)

MA 7 : Have you defined quality thresholds for inclusion/exclusion? (P)

MA 8 : Have you performed sensitivity analysis? (P)

MA 9 : Have you identified experts’ disagreement level with the kappa statistic? (P)

Data Validity

TV 8 : Is your sample size large enough so that the obtained results can be considered valid?

MA 1 : Have you tried to draw conclusions based on trends? (C)

MA 2 : Have you used a broad search process in generic search engines or indices (e.g., Google Scholar) so that you ensure the identification of all relevant publication venues? (P)

TV 9 : Have you chosen the correct variables to extract?

MA 1 : Has the choice of variables been discussed among authors, so as to guarantee that the set of research questions can be answered by analyzing them? (P)

TV 10 : Are the primary studies in your dataset published in a limited set of venues?

MA 1 : Have you used snowballing? (P)

MA 2 : Have you included grey literature (if this does not affect TV 6 )? (P)

MA 3 : Have you manually scanned selected venues to check if they publish articles related to your secondary study? (P)

TV 11 : Do you expect to identify relationships in your dataset?

MA 1 : Have you performed pilot data extraction to test the existence of relationships? (P)

TV 12 : Does the quality of primary studies guarantee the validity of extracted data?

MA 1 : Have you focused your search process on quality venues only? (P)

MA 2 : Have you used article quality assessment as an inclusion criterion? (C)

MA 3 : Have you assessed the validity of primary studies and their impact using statistics? (C)

TV 13 : Is there data extraction bias in your study?

MA 1 : Have you involved more than one researcher? (P)

MA 2 : Have you identified experts’ disagreement level with the kappa statistic? (P)

MA 3 : Have you performed pilot data extraction to test agreement between researchers? ( Not applicable if MA 1 is no ) (P)

MA 4 : Have you used experts or external reviewers’ opinion in case of conflicts? ( Not applicable if MA 1 is no ) (C)

MA 5 : Have you performed paper screening to cross-check data extraction? (P)

MA 6 : Have you used a keywording of abstracts? ( Applicable only in mapping studies ) (P)

TV 14 : Have you performed statistical analysis?

MA 1 : Does your data extraction plan record quantitative data and if yes, does answering your research questions imply the use of statistics? (C)

TV 15 : Have you selected a robust initial classification schema?

MA 1 : Have you selected an existing initial classification schema? (P)

MA 2 : Have you continuously updated the schema, until it becomes stable and classifies all primary studies in one or more classes? (C)

TV 16 : Is your interpretation of the results subject to bias or is it as objective as possible? MA 1 : Have you performed pilot data analysis and interpretation? (P)

MA 2 : Have you conducted reliability checks (e.g., post-SLR surveys with experts)? (C)

MA 3 : Have you used a formal data synthesis method? (P)

MA 4 : Have you performed sensitivity analysis? (P)

MA 5 : Have you used the scientific quality of primary studies when drawing conclusions? (P)

Research Validity

TV 17 : Is your process reliable/repeatable?

MA 1 : Have more than one researcher been involved in the review process? (P)

MA 2 : Have you made all gathered data publicly available? (C)

MA 3 : Have you documented in detail the review process in a protocol? (P)

MA 4 : Have you appropriately documented the details of conducting the review? (P)

TV 18 : Have you chosen the correct research method?

MA 1 : Have the authors discussed if the selected research method (SLR or SMS) fits the goals/research questions of the study, by advocating the purpose and scope of the methods? (C)

MA 2 : Have you developed a protocol, monitored the process for deviations, and accurately reported any (if existed)? (P)

TV 19 : Do the answers to your research questions guarantee the accomplishment of your study goal?

MA 1 : Have the authors discussed and brainstormed on if the research questions holistically cover the goal of the study? (P)

MA 2 : Is your study and research questions well-motivated? (P)

MA 3 : Have you consulted target audience for setting your research goals? (P)

TV 20 : Does your study have substantial related work, so that you can compare and discuss findings?

MA 1 : Have the authors discussed and brainstormed to reach possible interpretations of the findings, due to the absence of related studies? (P)

TV 21 : Were you familiar with the research field before performing the review?

MA 1 : Have the authors exhaustively searched related work so as to: (a) familiarize with the field, (b) identify comparable studies, and (c) identify relevant publication venues and influential papers? (P)

TV 22 : Are the results of your study generalizable?

MA 1 : Do your findings comply with those of existing studies? (C)

MA 2 : Have you used a broad search process without an initial starting date? (P)