Instituto Superior de Engenharia do Porto

Mestrado em Engenharia Informática

Preparação para a Dissertação
Revisão da Literatura

TP: ACS

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Revisão da Literatura
Methods

- We saw the need for a systematic method
- The Systematic Mapping Review method was the most adequate
    - A simplified version of the SLR

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Mapping- Goal

Main goals of mapping studies:

- To provide an overview of a research area, to evaluate the quantity and type of research and results available in the area and,
- to determine the publications where research is published
- to identify gaps in the research

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Mapping- The Method

Stages:
1. Protocol and definition of research questions
2. Conducting the search for primary studies
3. Screening
4. Classification system
5. Coding: data extraction and aggregation
6. Analysis and report

- The method includes, for each step:
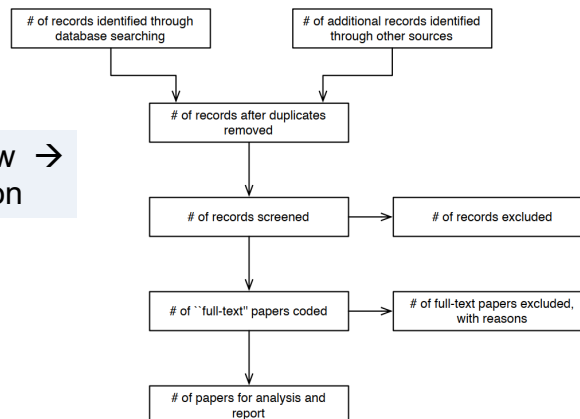 - Purpose
  - Outcomes
  - QA activities

Parts not applicable parts in GREY

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Mapping- The Method

- The method allows to obtain the information in the figure, and with the same flow

PRISMA flow →
of information

# of records identified through database searching	# of additional records identified through other sources

# of records after duplicates removed

# of records screened → # of records excluded

of ``full-text'' papers coded → # of full-text papers excluded, with reasons

of papers for analysis and report

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1. Protocol

- Stage Purpose: Develop the protocol that will guide the MS effort in a rigorous way.

- Outcomes: A protocol able to guide the review and covering all the stages.

- QA: Using the PICOCS structure, verify if the search strings are part of the I/E criteria.

- Review the protocol to know if it is complete - covers all stages - and is coherent with the goals of the systematic mapping review, so it allows the researchers to answer the research questions. Protocol can be reviewed later
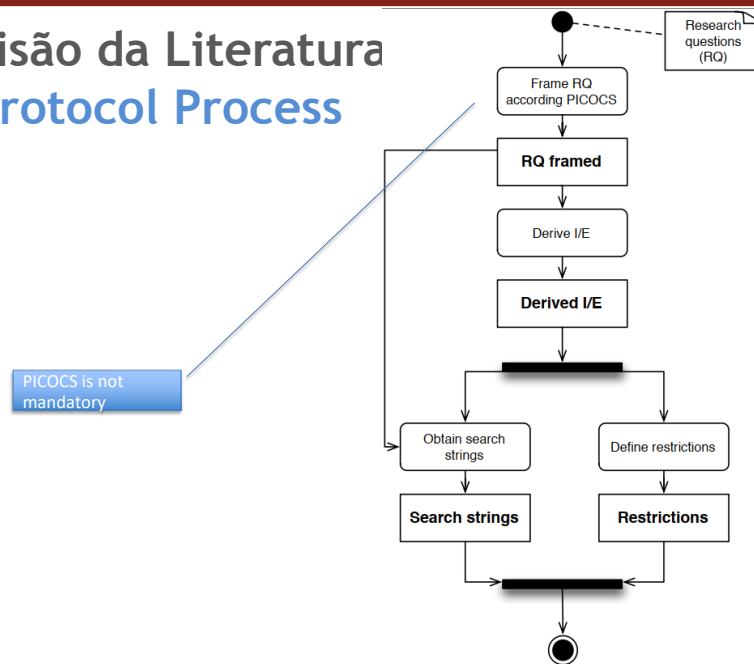
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1. Protocol Main Points

- Goal(s) and research question(s);
- Define a draft of inclusion/exclusion criteria, the search strategy, the screening process and, possibly, a first approach to the categories and forms to be used during the data extraction stage.

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1. Protocol Process

PICOCS is not mandatory

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1. Protocol

- **Research questions**
- All research should be guided by research questions
- To help framing a research question for a review, you can use the PICOCS model
- PICOCS Goal: help understand what the reviewer wants

- Model with examples:
  - Population of interest: studies in English, or more restrictive, as for example, financial domain
  - Intervention: introduction of TDD
  - Comparison: no use in MS
  - Outcomes: number of defects after software delivery
  - Context: student projects, final course project, professional.
  - Study design: case study

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1. Protocol

- RQ example: What studies are there about the security of air transfer methods of trained ML models to resource-constrained embedded systems?
- RQ framed
  - Population: studies involving Resource-Constrained Embedded Systems
  - Intervention: air transfer methods of trained ML models
  - Comparison: --
  - Outcomes: security
  - Context: practitioners
  - Study design: empirical studies

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1. Protocol

- RQ example (adapted from) : What studies are there about estimation models for predicting effort for Web projects?
- RQ framed
    - Population: studies involving web projects
    - Intervention: project effort estimation model
    - Comparison: --
    - Outcomes: prediction or estimate accuracy.
    - Context: practitioners
    - Study design: empirical studies

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1. Protocol

- RQ example: Are there empirical studies and experience reports about automated software testing observed benefits and limitations in industry at large?
- RQ framed
    - Population: studies in industry at large
    - Intervention: automation of software testing
    - Comparison: --
    - Outcomes: benefits and limitations
    - Context: practitioners
    - Study design: empirical studies and experience reports

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1. Protocol

- PICOCS guidance: by filling the table horizontally.
- It is not mandatory to use a table, the flow is what matters
- Example next

PICOCS Component	RQ	I/E	Strings
P			
I			
C			
O			
C			
S			

Revisão da Literatura
1. Protocol

- PICOCS use. RQ:
  - Are there empirical studies and experience reports about automated software testing observed benefits and limitations in industry at large?

PICOCS	RQ part	I/E	Sub String
P	Studies in industry	I-Studies in industry E-prior 2010	>=2010
I	Automated testing	I_Studies about automation testing I-Studies comparing automated with no automated	Automated testing; test automation; Comparing; comparison
C	---		
O	Benefits and limitations	E- studies not presenting limitations	Benefits; limitations; impact
C	Industry	I-with professionals only	Industry; professionals
S	Empirical and experience reports	E- surveys	Empirical study; Case study;

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2.Conducting the Search

- Purpose: Find the primary studies potentially relevant for reviewing.
- Outcomes: All the papers selected by the searches with the information related to each search.
- The returned information can include: the library, date of the search, restrictions to the search, search strings, records, number of records and any other information relevant to the search.
- QA: For the search, repeat some or all of the searches and compare the results.

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2.Conducting the Search

- If the researcher was already in possession of other studies, these should be added to the result of the search.
- Check for duplicates among all the studies and remove them. Record the excluded.

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3. Screening

- Purpose: Select the relevant studies for reviewing.
- Outcomes: The set of relevant papers for coding, that is, the primary studies that pass the criteria together with the all the criteria (and codes) applied to each paper reflecting the decisions taken.

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4. Classification System

- Purpose: Define the classification system to be used to classify the papers, paying attention to the Research questions.
- Outcomes: A way (classification system) to organize the papers in order to answer the research questions.
- QA: Verify if the classification system is aligned with the research goals and questions using the PICOCS model by checking if the categories are covered by the search strings

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5. Coding

- Purpose: The goal of this stage is to extract and record data from the relevant primary studies, and map these studies to the categories (of the system) developed previously.
- Outcomes: The outcome of this stage is a synthesis, that is, the relevant papers organized (classified) according the classification system, possibly in the form of a map, or a table.

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6. Analysis and Report

- Purpose: Analyze the map and produce a report
- Outcomes: An informative analysis of the studies presented in a report describing all the stages; answer to the research questions
- QA: Check if the research questions were answered and the order and coherence of the diagram of flow information

Revisão da Literatura
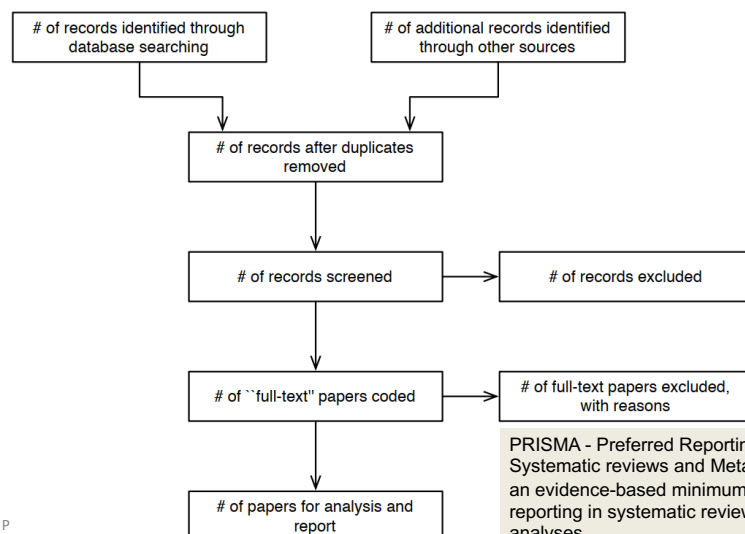## 6. Analysis and Report

- How to describe the flow of information?
- Use PRISMA - is an evidence-based minimum set of items for reporting in systematic reviews
  - → next slide PRISMA flow

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PRISMA - Preferred Reporting Items for Systematic reviews and Meta-Analyses. It is an evidence-based minimum set of items for reporting in systematic reviews and meta-analyses

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Literature Reviews
Conclusion

- Systematic Methods: main activities.

- The process can be iterative

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Digital Libraries

- For the exercise, the digital library of ACM can be used:

  dl.acm.org

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FIM

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