

How to write a research abstract

Research Methods - Barbara Russo

SwSE - Software and Systems Engineering

Beck Kent

- Founder of the agile method of development
- eXtreme Programming
- Agility in writing a paper
- A long experience in reviewing articles

K.Beck's personal view

- Write the programme Committee
- One startling sentence
- Argument: problem, defence, related work
- Abstract

Write the programme Committee

- PC made of experts in the field
- PC's desk piled with papers
- 30 seconds to grab their attention
- If the paper is of broad interest there must be a spark in it
- If your paper is technical they may not be familiar with it. It must readably present the novel aspects of the work

One startling sentence

- Temptation to write everything of your work
 - Boil your message down to one startling sentence
 - Danger
 - Open to criticisms
- Example
 - “Network garbage collection is fast and easy”
 - The sentence is clear and open to discussion

Argument: problem, defence, related work

- Stand for the validity of your startling sentence
- Convince of the truth of your sentence

Divide your paper into four sections

- First section: the problem to be solved
 - Why is a problem
 - Importance to solve it
- Second section: describe the problem
 - Related work justifying the problem
 - Implementation details

Divide your paper into four sections

- Third section: solution of the problem
 - Discuss all the reasonable counter arguments
- Fourth section: what other people have done in the area
 - convince of the novelty

Abstract

- A four sentence summary of the conclusion of the paper
- First sentence: state the problem
- Second sentence: why the problem is a problem
- Third sentence: the startling sentence
- Fourth sentence. Implication of the startling sentence

Exercise - Find the 4 sentences

Abstract

In this paper, we focus on the evaluation of the factors that impact on the introduction of Open Source Software (OSS) by means of the analysis of Open Data Standards (ODS) generation. In this sense, we model the generation of Open Data Standards as a self reinforcing mechanism that perpetrates through time. To perform such analysis, we use urn models, models that are typically deployed when modelling path dependent processes. First, we perform the identification of the variables that impact on the generation effect, in particular Network Externalities that arise due to the presence of a large number of files and size of the files created. Second, we evaluate the urn selection process through a multi-urn schema. The main findings are a confirmation of the importance of Network Externalities as reported by theory and the importance of past historical file generation for the subsequent file generation process.

New abstract

Exercise - Find the 4 sentences

Former abstract

In this paper, we focus on the evaluation of the factors that impact on the introduction of Open Source Software (OSS) by means of the analysis of Open Data Standards (ODS) generation. In this sense, we model the generation of Open Data Standards as a self-reinforcing mechanism that perpetrates through time. To perform such analysis, we use urn models, models that are typically deployed when modelling path dependent processes. First, we perform the identification of the variables that impact on the generation effect, in particular Network Externalities that arise due to the presence of a large number of files and size of the files created. Second, we evaluate the urn selection process through a multi-urn schema. The main findings are a confirmation of the importance of Network Externalities as reported by theory and the importance of past historical file generation for the subsequent file generation process.

New abstract

The decision about the adoption of Free/Libre/Open Source Software (FLOSS) is a key issue in Small and Medium Enterprises (SMEs). Indeed, very often such organisations don't have the resources needed to fully evaluate the migration from existing legacy systems. To help the decision process of these organisations, we propose a preliminary study about an instrument based on the analysis of files' generation of targeted data standards. We model the file generation process as a self-reinforcing mechanism through the usage of urn models.

By applying the instrument to a large dataset in the office automation field, we found a first confirmation about the importance of network externalities as reported by theory and the importance of past historical file generation for the subsequent file generation process

What is the state of the art?

Research Methods - Barbara Russo

SwSE - Software and Systems Engineering

Types of studies

- Primary studies
- Secondary studies
- Tertiary studies

Systematic mapping studies

- Main goal: provide an overview of a research area
- Identify the quantity and type of research and results available within it

Systematic mapping studies

- The research questions are **general** as they aim at discovering research trends e.g. publication trends over time, topics covered in the literature

Systematic mapping studies

- The **outcome** is an inventory of papers on the topic area, mapped to a classification

The process

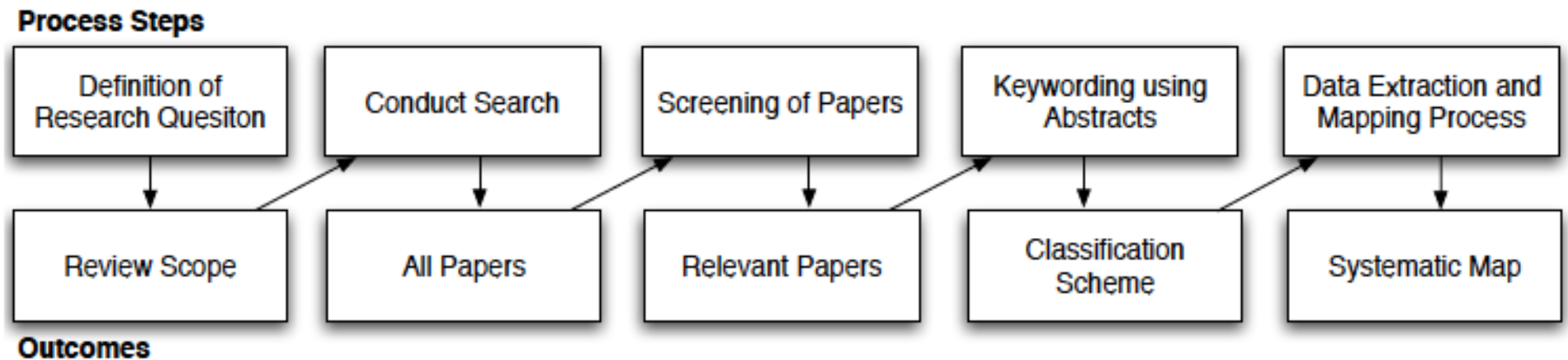


FIGURE 1: The Systematic Mapping Process

Research questions

- Formulate your goal
- Derive your research questions that answer the goal
- Derive keywords for the RQ

Example

- Goal: Explore the **evolution of motifs** of software systems over releases and identify those that can signal **critical system's states**
 - RQ1: Are **structurally stable** motifs the most dominant across releases of software systems
 - RQ2: Are changes in **motif significance** sign of specific **maintenance** activities?
 - RQ3: Are unstable motifs indicators of system criticality?

Search with PICO

- PICO: Population, Intervention, Comparison and Outcomes
- It was developed to identify keywords and formulate search strings from research questions - Kitchenham and Charters

Population

- It may refer to specific role, category of stakeholders, an application area or an industry group
- Example: call graphs of software systems

Intervention

- It is the methodology/tool/technology/procedure that addresses a specific issue, for example, technologies to perform specific tasks such as requirements specification, system testing, or software cost estimation
- Example: motifs occurrence and evolution

Comparison

- It is the methodology/tool/technology/procedure with which the research is being compared.
- When the comparison technology is the conventional or commonly-used technology, it is often referred to as the “**control**” treatment
- Example: global architecture evolution (if applies)

Outcome

- It may relate to **factors of importance** to practitioners such as improved reliability, reduced production costs, and reduced time to market.
- Example: system criticality states

Two starting approaches

- start with search strings in different databases (in software engineering) or
- start with the reference lists of a starting set of papers (in information system)

Select your databases

- IEEE
- ACM
- Scopus
- Google scholar
- Microsoft research
- Elsevier
- Springer

Snowballing

- Forward snowballing: articles that have cited the articles found in the search
- Backward snowballing: articles extracted from the reference lists

Selection (reading title and abstract)

- Inclusion
 - State the criteria for inclusion and use snowballing on citations
- Exclusion
 - State criteria for exclusion
- In doubt read the full paper

Example - inclusion

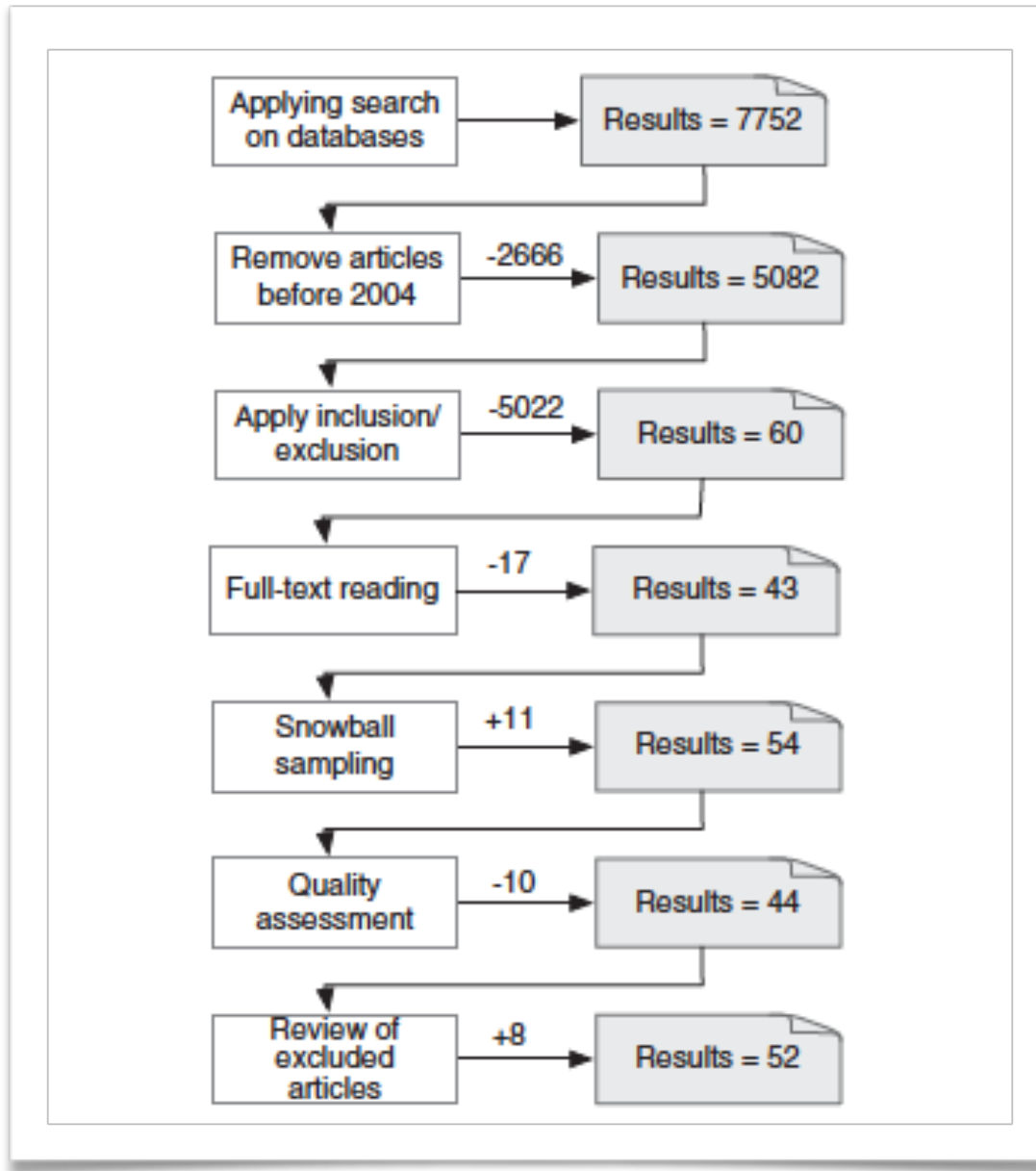
- Studies present the research method and result on motifs (any environment) &
- Studies were published online in the time frame in the last 10 years &
- Studies on micro-architecture evolution

Exclusion - exclusion

- Studies speaking of global architecture of call graphs or
- Studies speaking of call graphs in general or
- Studies speaking of complex networks in general or
- Studies not accessible in full-text or
- Books and grey literature or
- Studies that are duplicates of other studies

Analysis and classification

- Extract information for each item and represent it visually.
- Group topics into themes and sub-themes
- Assign a paper to a them or sub-theme
- Count papers per theme and visually plot the count



Kai Petersen, Sairam
Vakkalanka, Ludwik Kuzniarz

Systematic Literature review

- Systematic reviews aim at aggregating evidence and hence a very specific goal has to be formulated (e.g. whether an intervention is practically useful by industry) - Kitchenham et al.

Why LR

- To **summarise** the existing **evidence** concerning a treatment or technology
- To **identify** any **gaps** in current research in order to suggest areas for further investigation
- To provide a framework/background in order to appropriately **position new research activities**

The review protocol

- **Background.** The rationale for the survey.
- The **research questions** that the review is intended to answer
- The **strategy** that will be used to search for primary studies including search terms and resources to be searched
 - An **initial mapping study** can help determine an appropriate strategy

The review protocol

- **Study selection criteria.** Study selection criteria are used to determine which studies are included in, or excluded from, a systematic review.
 - It is usually helpful to **pilot** the selection criteria on a subset of primary studies.

The review protocol

- **Study selection procedures.** The protocol describes how the selection criteria will be applied e.g. how many assessors will evaluate each prospective primary study, and how disagreements among assessors will be resolved

The review protocol

- **Study quality assessment** checklists and procedures. The researchers should develop quality checklists to assess the individual studies.
- **Data extraction strategy.** This defines how the information required from each primary study will be obtained.

MP vs LR

- The search for studies in systematic maps is based on a topic area, while literature reviews are driven by specific research questions

Citations network

- Pajek tool
- <http://vlado.fmf.uni-lj.si/pub/networks/pajek/>