

# Systematic reviews and maps

## Avoiding plagiarism

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# There are two kinds of studies

- ▶ *primary studies*
  - ▶ *secondary studies*
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# There are two kinds of studies

- ▶ *primary studies* – studies that directly observe, manipulate, create etc. the phenomena of interest
- ▶ *secondary studies* – studies that summarise, analyze, consolidate, categorise etc. other (usually primary) studies
  - ▶ It is also possible to have *tertiary studies*, which are like secondary studies but they summarise etc. secondary studies. They are, however, fairly rare.<sup>1</sup>

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<sup>1</sup>E. g. Fabio Q. B. da Silva et al: *Six years of systematic literature reviews in software engineering: An updated tertiary study*, 2011. Note: In order to save space in these slides, I omit bibliography data from most source citations. The title will, in those cases, be a clickable hyperlink.

# There are three main kinds of secondary studies

- ▶ traditional (narrative) reviews
  - ▶ Ville will discuss these later in this seminar
- ▶ systematic literature reviews (systematic reviews)
- ▶ systematic mapping studies (systematic maps)

# What is so systematic about systematic reviews and maps?

- ▶ planned
- ▶ documented
- ▶ follow current best practice

# Current best practice in software engineering

- ▶ Barbara Kitchenham & Stuart Charters: *Guidelines for performing Systematic Literature Reviews in Software Engineering*, 2007.
- ▶ Barbara Kitchenham & Pearl Brereton: *A systematic review of systematic review process research in software engineering*, 2013.
- ▶ Kai Petersen et al: *Systematic Mapping Studies in Software Engineering*, 2008.
- ▶ Kai Petersen & Sairam Vakkalanka & Ludwik Kuzniarz: *Guidelines for conducting systematic mapping studies in software engineering: An update*, 2015.
- ▶ See also Chapter 5 of Antti-Juhani Kaijanaho: *Evidence-based programming language design: a philosophical and methodological exploration*, 2015.

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# Suggested reading for CSE

- ▶ Petticrew & Roberts: *Systematic Reviews in the Social Sciences. A Practical Guide*. Malden, MA: Blackwell, 2006.
- ▶ *Campbell Collaboration Systematic Reviews. Policies and Guidelines. Version 1.0*. Campbell Systematic Reviews supplement 1, 2014.
- ▶ *What Works Clearinghouse Procedures and Standards Handbook. Version 3.0*. 2014.
- ▶ see also the SE recommendations on the previous slide

# Basic process for systematic reviews and maps

1. plan the study
  - ▶ research questions you want to answer
  - ▶ a detailed plan for each of the following steps
2. keep detailed records of your actions in steps 3–6
3. search for potentially relevant publications
4. decide which publications found by your search to include in your study, and which to exclude
5. extract relevant information from included publications
6. synthesize answers to your research questions
7. evaluate the threats to validity of your study
8. report your study to all relevant stakeholders



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7. evaluate the threats to validity of your study
8. report your study to all relevant stakeholders, e. g.
  - ▶ whoever paid for your study
  - ▶ academic credit
  - ▶ the research community at large
  - ▶ the practitioner community at large

# The difference between a review and a map

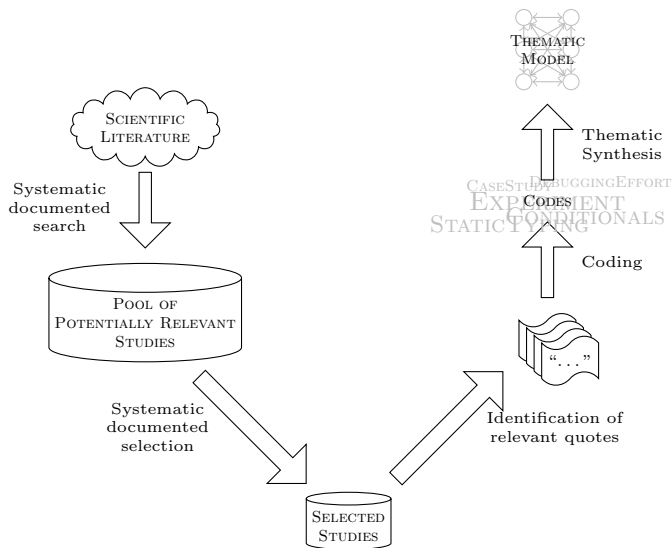
- ▶ A *systematic (literature) review* asks and answers **specific questions** that are **relevant to practitioners**, and usually aims to **resolve uncertainty** about best practice and to generate **practical advice** based on the research literature. It always includes a well-founded synthesis of the research results reported in the literature.
- ▶ A *systematic mapping study* asks and answers **broad questions** about the **state of research** in a particular field, and usually aims to **give an overview** of, and **identify gaps** in, the research literature. It rarely includes a synthesis of research results.

However, many researchers call their studies systematic reviews even though they are properly classified as mapping studies.

## Recent examples

- ▶ Antti-Juhani Kaijanaho: *Evidence-based programming language design: a philosophical and methodological exploration*, 2015.
- ▶ Upulee Kanewala & James M. Bieman: *Testing scientific software: A systematic literature review*, 2014.
- ▶ Birgit Penzenstadler & others: *Systematic mapping study on software engineering for sustainability (SE4S)*, 2014.
- ▶ Juan A. Vargas & others: *A systematic mapping study on serious game quality*, 2014.

# A mapping study design



Adapted from Chapter 7, p. 111, of Kaijano 2015

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# What do they have to do with Master's Theses?

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- ▶ A proper systematic review is a huge amount of work (several person-years).
- ▶ A Master's Thesis
  - ▶ can be a systematic review or a map (but take care to keep it manageable)
  - ▶ can also *include* a systematic review or map (but that's even more challenging to keep manageable)
  - ▶ is not expected to be up to academic publication standards – you can get a good MSc thesis even if you (intelligently) cut corners
    - ▶ just be honest about it in your thesis

## Past BSc and MSc theses using these ideas<sup>2</sup>

- ▶ Olli Kauppinen: Mobiilipohjaisen hälytysjärjestelmän hyödyntäminen viranomaisviestinnässä ja kriisinhallinnassa: interaktiivinen lähestyminen. MSc (mobile systems) 2012.
- ▶ Jaakko Pallari: Multithread concurrency in a single thread environment. MSc (software and telecommunication technology) 2015.
- ▶ Rauno Rähkä: Abstrakti luokka vai rajapinta uudelleenkäytettävyyden näkökulmasta. BSc (software engineering) 2013.
- ▶ Ari Tuhkala: Taulutietokoneet opettajan työssä. BSc (education) 2012.

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<sup>2</sup>I make no comment on their quality or on the grade they received.

## Further reading

- ▶ Andy Oram & Greg Wilson (eds): *Making Software: What Really Works, and Why We Believe It*. O'Reilly, 2011.
- ▶ Gordon C. S. Smith & Jill P. Pell: *Hazardous journeys: Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials*. *BMJ* 327:1459, 2003.
  - ▶ Patrick Czorlich & Till Burkhardt et al: *Does usage of a parachute in contrast to free fall prevent major trauma? A prospective randomised-controlled trial in rag dolls*. *European Spine Journal*, online first, 14 January 2016.
- ▶ John P. A. Ioannidis: *Why Most Published Research Findings Are False*. *PLoS Medicine* 2 (8) e124, 2005.
- ▶ John P. A. Ioannidis: *Why Most Discovered True Associations Are Inflated*. *Epidemiology* 19 (5) p. 640–648, 2008.

# Let's ponder silently for a minute

1. How would you define plagiarism in the context of university studies and theses?
2. How can you avoid plagiarizing in your thesis?
3. What happens if a student is caught plagiarizing in their studies or thesis?



# Discuss among your neighbors

1. How would you define plagiarism in the context of university studies and theses?
2. How can you avoid plagiarizing in your thesis?
3. What happens if a student is caught plagiarizing in their studies or thesis?

## Academic fraud is a serious offense<sup>3</sup>

*“Plagiarism or any other academic fraud by a student is not only an offence to the student’s teachers and supervisors but also an offence to the whole University community and the ethical principles the community follows.”*

*“The University and everyone operating in it must take even the slightest fraud very seriously. If any teacher, other employee or student notices academic fraud, they must inform the representative of the unit. All proven cases of academic fraud will lead to consequences.”*

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<sup>3</sup>Quotes from the unofficial translation of the Rector’s decision on June 13, 2013, entitled *Code of conduct for preventing and dealing with academic fraud and plagiarism*.

*“In the context of studies, fraud refers to any dishonest activity a student uses to give a false impression of his/her own or someone else’s skills in order to affect the approval or evaluation of a study unit.”*

*“Plagiarism is a form of academic fraud. It is generally defined as activity in which a person represents the work of another person as his/her own original work.”*

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<sup>4</sup>Quotes continue from the Rector’s decision.

*“Section 45 of the Universities Act (558/2009) states that if a student breaches the rules of teaching, he/she may, depending on the seriousness of the breach, be cautioned or suspended from the University for a fixed period of one year, at the most.”*

Also, a thesis that is known to contain plagiarism or other fraud cannot be accepted before the issue has been fixed.

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<sup>5</sup>Quotes continue from the Rector's decision.

# Law versus ethics

What the law allows and what is academically ethical are two different things.

- ▶ It is possible to commit plagiarism even if there is no copyright infringement.
- ▶ It is possible to infringe copyright even if there is no (academic) plagiarism.

In your academic pursuits (studies and research), you are expected to comply with both the law and your academic ethical obligations.<sup>6</sup>

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<sup>6</sup>In certain situations, a lawful obligation may be so grossly unjust as to make breaking it ethical or even morally compelled. For a well known example, see the Nuremberg trials shortly after the Second World War. The current intellectual property system (copyrights, patents and trademarks) does not, in my opinion, involve that level of injustice.

# Avoiding plagiarism

You should always follow the following four guidelines:

- ▶ If you use ideas, expressions, or anything else from someone else, you must include a proper attribution.
  - ▶ In most cases, this means a correct citation to the literature.
- ▶ If you use more or less the words written or uttered by someone else in more or less the same sequence, you must indicate that you are quoting.
  - ▶ Even if you translate it from another language!
- ▶ If you are quoting, you must take care to either quote verbatim, or clearly indicate any changes you made.
- ▶ If you are quoting, you must take care not to misrepresent the original author's writing.

# Quoting appropriately

- ▶ Paraphrasing instead of quoting is usually preferable.
- ▶ Quoting is appropriate, when
  - ▶ it is important to show the reader the exact original phrasing, or
  - ▶ there is no other way to phrase it (modulo minor changes)

Be prepared to defend your choice to your supervisor!

- ▶ Modifying a quote (with changes indicated) is appropriate, when the goal is to
  - ▶ shorten it
  - ▶ make it fit grammatically to the surrounding text
  - ▶ avoid misleading the reader

## Indicating a quote

There are two standard ways to indicate a quote:

- ▶ Use quotation marks (“like this”)
- ▶ Use blank lines and indentation to clearly set a quote apart from the rest of the text:

Like this.

It may be a good idea to use quotation marks even then, just to be sure.

- ▶ For example:

”Even at this date, computing was not the sole domain of women. It was really the job of the dispossessed, the opportunity granted to those who lacked the financial or societal standing to pursue a scientific career.”<sup>7</sup>

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<sup>7</sup>David Alan Grier: When Computers Were Human. Princeton University Press, 2005. Page 276.



## Indicating changes to a quote

- ▶ If you replace one or more words in a quote with others, or add words to a quote, you must put the new words in brackets.

“Even at this date, [the profession of] computing was not the sole domain of women.”<sup>8</sup>

- ▶ If you leave out words from the middle of a quote, you must replace them with an ellipsis (...); it may be a good idea to add brackets around it. For Finnish text, use two en dashes (–) instead.

“Even at this date, computing [...] was really the job of [...] those who lacked the financial or societal standing to pursue a scientific career.”

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<sup>8</sup>David Alan Grier: When Computers Were Human. Princeton University Press, 2005. Page 276.

# More about quoting

- ▶ If you quote a passage that includes *italics* or other emphasis, indicate verbally whether or not you have retained it. Use:
  - ▶ “emphasis in the original”, or
  - ▶ “emphasis omitted”
- ▶ If you add emphasis to a quote, indicate this verbally (“my emphasis”).
- ▶ If you translate a passage from a source and include the translation directly in your text, treat it as a quotation. Also indicate that it is your translation (“my translation”).
  - ▶ It’s better to use a published translation, if one exists.

# Using someone else's code in your programs

- ▶ Your ethical obligation to avoid plagiarism **applies also to any program code you write** during your studies and research.
- ▶ Acknowledge in comments the source of any code you have copied from someone else.
  - ▶ Place the comment as close to the copied code as practicable.
  - ▶ Make sure that it is clear to someone reading your code what code is yours and what is from others.
- ▶ Remember to comply with the copyright law, as well.