Recommendations for the Formal Design of Scientific Theses

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1   Introduction

Scientific papers/ final degree theses have the purpose of developing and disseminating knowledge. The author executes examinations and develops arguments based on the previous state of knowledge. It is, therefore, necessary to choose the right formal standards that allow others to understand the results of the specific scientific work. From this substantive and formal requirements can be deduced. These recommendations[1] are meant as references for preparing scientific work during university education (exercises, internship documentations, seminar theses, study theses or bachelor, and master theses). Adhering to these rules serves the purpose of developing a concise **formal** design for the above-named written works.

Concerning the **content-wise** requirements please be aware of the following statements[2]. First, make sure that your thesis matches the topic (e.g. the title of the work describes the content as concisely as possible). The outline is part of the thesis and shows to what extent the topic is understood and worked upon. It has, therefore, the purpose to reflect the logical structure of the work ("the leitmotif") and should give a first glimpse of the thesis content. The following points should be taken into account while writing the main part:

* clear definitions and conceptual consistency;
* thorough and understandable assertions and arguments;
* consideration of the width, depth and completeness of the topic presentation;
* relevance of the single statements and arguments as well as avoiding unnecessary redundancy.
* As a basis you should presume the common scientific knowledge which means that you should not "reinvent the wheel". Other, not generally known material (literature) needs to be referenced in the bibliography; in this context, systematic literature research and review are key aspects of every scientific work.

The objectives (and thus the assessment criteria) of scientific papers and theses have different levels of extent. In a seminar thesis emphasis is laid on the systematic treatment of a clearly defined subject area under temporal and spatial constraints. In contrast to that, a final degree thesis is bound to contain independent processing of a problem using scientific methods, which must indicate an appropriate and unique personal contribution.

These recommendations for the formal design of scientific texts especially relate to theses written at the Institute of Information Systems at UHH. Other institutions might have

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[1] This text contains uncited components of similar recommendations from other universities or institutes.

2 Apart from that we recommend the expansive literature relating to this topic [in German], e.g. Rossig, W.E.; Prätsch, J. (2001): Wissenschaftliches Arbeiten. 3. Ed.., Wolfdruck Verlag, Bremen, Germany.

different requirements (e.g. in terms of citation or page layout). Therefore, we recommend to stick to the formal regulations at your supervisor's institute.

2   Organizational Instructions

2.1   Seminar Theses

While writing your seminar thesis, please proceed in the following way:

- Evaluating the available literature (based on the hints given on the topic)
- Defining and differentiating the problem
- Designing the outline
- Presenting your outline to your (advisor) supervisor (during an individual meeting or during office hours)
- Writing the thesis by giving special attention to these recommendations
- Up to 15 pages of written content for a group of two people (counted without table of content, bibliography or appendices) or (in agreement with your supervisor) about 12 pages per group member in a larger group.

The submission date will be given during an introductory meeting or later online. It is mandatory to meet this deadline. You can hand in your seminar thesis to the secretary or at your supervisor's office. Depending on the agreement with your supervisor, please hand in your seminar thesis as electronic version (as a LaTex-file, Word-document or as Pdf-file) and as a single paper version (perforated and bound with a simple filing strip. If your thesis contains an implementation, the latter must be included in the electronic version

2.2   Study Theses or Final Degree Theses

Please find current information and thesis topics on our IWI website. If you are interested in one of these thesis topics, please get in contact with the specific advisor. Apart from that, you can also find a current list of institute members including their preferred research interests. If you have found an individual topic, we recommend to choose one of our employees who has the same research focus and contact him/her directly.

Please do not contact several of our staff members at the same time! You will be forwarded in case your topic does not fit into the schedule/ research area of the contacted person!

While writing your study or final degree thesis, please proceed in the following way:

- Evaluating the available literature (based on the hints given on the topic)
- Defining and differentiating the problem
- Designing the outline

- Presenting your outline to your (advisor) supervisor (during an individual meeting or during office hours)
- Creating a classification of used terms
- Writing the thesis by giving special attention to these recommendations
- In terms of duration, the scope of the thesis needs to be clarified with the advisor and also depends on your own study program (please inform yourself properly at your student office about deadlines!).

Particularly for final theses, you must adhere to the conditions in your respective examination regulations when it comes the number of copies that must be submitted. If necessary, the information can be obtained from the study office, e.g. via their websites. However, it is mandatory to add an electronic version to **every** paper version (usually as a pdf document, **but without PDF-A standard and without write protection!**) If an implementation has been created in the course of the work, it must be added to every electronic version. Likewise, all Internet or non-free sources must be stored there.

3   General Recommendations

3.1   Binding, Paper, Layout, Templates

Study or final degree theses have to be bound according to the rules of the respective study office. Other theses and works (seminar theses, project reports) need to be perforated and bound with a simple filing strip or **can be handed in- upon consultation with your advisor/supervisor – as an electronic version only**.

The sheets have to be white and in format DIN A 4 (of course, recycling paper is allowed) and should be imprinted on both sides. It is common to use a proportional font (e.g. Times New Roman) with a font size of 11 or 12pt and a line spacing of 1 to 1.5. In accordance with general principles the layout should have an appropriate and sensible page and text format. The margins should be large enough (e.g. for the filing or binding).

For seminar theses, which are commonly written in MS Word or LaTex format, the Institute's templates should be used. By using MS Word, please adhere to the formatting rules of the template given by the Institute.

3.2   Language / Language Level

In agreement with your advisor and the supervisors and in accordance with the examination procedures (Bachelor or Master Examination Regulations, Audit Committee) the thesis should be written either in German or in English language. (Of course) it is necessary to strictly adhere to spelling and grammar rules according to Oxford Dictionary, Merriam Webster, etc. This also includes typographical guidelines for the use of quotation

marks, hyphens, as well as for the insertion of spaces after dots or commas! It is important to ensure that a concise spelling is used throughout the whole thesis.

3.3   Consistency

In these recommendations, some points are not exhaustively regulated, so that writing your thesis gives you a certain freedom of choice. In addition to proving the usefulness of the resources, especially their consistent use is important[3]. That is, for example,

- the same level for line spacing before and after headings,
- identical formatting of paragraphs, bullet-points, etc.,
- consistent spelling of words, where multiple spellings are allowed
- uniformity of bibliography and citation

3.4   Ordering Scheme

The following scheme is recommended for the formal order of final degree and study theses. The points in bold are part of every written work (in particular of a seminar thesis):

a) blank cardboard cover
b) **title page** (see attachments)
c) foreword (optional)
d) **table of contents**
e) directory for figures, tables, abbreviations and symbols (in case of existence)
f) **textual part (usually consisting of introduction, body and conclusion)**
g) annex (e.g. results, program code)
h) **references**
i) classified index (optional)
j) **affidavit (see appendix)**
k) blank cardboard cover
l) loose appendices (e.g. CD or USB-stick, secured in an envelope)

Apart from the blank cardboard cover pages all pages are numbered.

3.5   Outline

A logical and concise reasoning is also reflected in a balanced outline with corresponding sub-points (e.g., section headings). The heading of a section should, therefore, characterize its content in a scarce, but exact way and be numbered according to the level of detail within the paragraph. Preferably you should use a decimal numbering which can be expanded by summing up components into larger parts (A, B, ...) (e.g. see this text.) Usually a connecting passage is appropriate between a structure point on a higher level and its first

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[3] Text formatting programs (e.g. LaTex, MS Word) are an enormous support if used properly.

sub-structure point (for example by giving an introduction and overview regarding the following subsections). Paragraphs on the same level should be ranked accordingly and assume the overarching problem they have in common. (This means e.g.: Points 2.1.1 to 2.1.4 give partial solutions to the parent problem area 2.1. As far as possible, they should also have the same informational weight compared to one another as well as to other points on the same level (e.g. 4.1.1 - 4.1.6)).

You should ensure that within the outline there is, for example, not only sub-item 1.1 but also sub-item 1.2, etc. In this context you should avoid a verbatim repetition of the parent point (e.g. "3. Term and Nature ...", "3.1. Term ...", "3.2. Nature ..."). The single outline points should be provided with corresponding page numbers in the table of contents; they must match the headings of the sections in the text. A clear arrangement of the sub-headings facilitates insight. In the interest of clarity, too detailed breakdowns are to be avoided.

4 Recommendations for Various Topics

4.1 Preface, Introduction, Conclusion

The main part of the thesis can be preceded by a preface. The preface should only include personal observations of the author (e.g. about the occasion and incentives for writing something about this specific topic, special assistance or difficulties in the collection of material).

Substantive comments on the subject, goal and methodological structure of the thesis, on the rough classification within the scientific context, and eventually required definitions of basic terms should be given in the introductory section. Additionally, an overview of the thesis structure should be provided in the introduction. Often, an introduction is divided in to three subsections: problem, objective and course of the investigation. While it is unnecessary to accurately apply this arrangement or to subdivide the introduction at all these mentioned points, they should be addressed nonetheless.

The conclusive thoughts of the thesis should be, as far as possible, titled with an objective heading that reveals whether the author intends to summarize their results, to give a concise presentation of their theories or to conclude on unresolved issues.

4.2 Abbreviations and Symbols

Within the text abbreviations should be used sparingly. Only common abbreviations (cf. Oxford English Dictionary, Merriam Webster) like "etc., see, e.g." are acceptable. Topic-related abbreviations and acronyms, can be used; however, they are to be named in a list of abbreviations and to be explained during their first utilization within in the text.

Here are some examples of common abbreviations that can be especially used in the bibliography and are – as a rule – not listed within the list of abbreviations:

- cf. = compare
- cont. = continued here
- ed. = edition
- e.g. = for example
- et al. = and others
- et seq. = and the following page
- et seqq. = and the following pages
- i.a. = inter alia, amongst others
- iss. = issue
- p. = page
- Ph. = publishing house
- pub. = publisher
- Viz. = this means
- Vol. = volume
- yr. = year

Examples for acronyms which should be included in a list of abbreviations:

- LDLT = Load-Dependent Lead Times
- CIM = Computer-Integrated Manufacturing

The thesis should make use of a common, easy-to-understand symbolism. Eventually, it is sensible to add a list of symbols for explanation.

4.3   Utilization of Figures and Tables

Figures, tables and alike are used for visualization or in-depth presentation of issues addressed in the text. Corresponding objects are to be numbered consecutively and should be clearly named according to their content. While referring to the object (which is mandatory!) within the text, the object number must be named.

Furthermore, figures, tables and alike have to be listed in separate directories that are to contain the object number, the title and the corresponding page number. Citing tables or figures from other sources makes it mandatory to name the source appropriately (cf. Sections 5.1-5.3). If word processing programs such as MS Word or LaTex are used correctly, these directories can be created automatically. If necessary, these directories can be left out in agreement with your supervisor.

4.4 Footnotes

Footnotes should be on the same page as the passage to which they relate, and have to be numbered consecutively. Footnotes often contain information that differs from the main context, but they, nevertheless, contribute to it by complementing, contrasting or deepening the understanding. However, footnotes should be used sparingly because they slow down the readability. For footnotes as a way to clarify quotations see also Section 5.

4.5 Appendix

Extensive material (e.g. B. larger tables or graphical depictions, computer programs, etc.) should be given in the appendix or in an attachment. An appendix is not a mandatory part of the thesis. The comprehensibility of the thesis should be given without the attachments/ an appendix.

5   Citation Format and References

A scientific thesis is generally based on the current state-of-the-art. Therefore, already researched and published material is essential for your own argumentation. Whenever extrinsic ideas are reproduced, their origin has to be clarified by specific referencing, due to reasons of copyright and scientific honesty. As a rule, "common" knowledge of the given context (including established Textbook content) can be presupposed, whereas direct quotations and definitions always require a transparent documentation.

Your thesis will be uploaded into a plagiarism software called Turnitin (this, by the way, is done not only by our institute, but throughout the whole university), where citations and quotations are checked for their correct citation format and also regarding fraud and plagiarism.

5.1 Quotations

Quotations are distinguished by quotation marks. Essentially, quotes require literal accuracy. Deviations from the original are, therefore, clearly indicated by bracketed additions (eg. [A/N]; [Sic!]). Highlighted phrases in the quoted text should be adopted in principle; own highlighted phrases need to be indicated with [emphasis added]. Omissions of one or more words must be marked by three dots (...). Quotations within a quotation are marked at the beginning and at the end with an apostrophe ('...').

Basically, quotes from English sources do not need to be translated. Quotations from other languages require to be translated. It is necessary to specify the translator and add a footnote with the quote in the original language. When quoting non-German sources, you can use quotation marks from the original language (i.e., e.g: "..." in English quotations or «...» in French quotations). In general, a quote should not contain more than two or three sentences. If longer quotations become necessary, they should be indented in the text.

Each quotation needs to be checked for distortion or falsification of its original meaning when it is separated from its original context. In terms of correct referencing, it is also mandatory to indicate the page number(s) of a quote (c.f. Section 5.3.).

5.2   Citations

A citation is the adoption of thoughts of or in accordance with another author (but not a quotation!). Its extent must be clearly identifiable. An example is the non-literal takeover of models, algorithms and examples (but also the reproduction of figures or graphs by using a self-created design or embedding them into a self-created figure/graph).

 Basically, it is mandatory to cite the original source; citations from secondary literature are only acceptable if the original work is apparently not available. In this case, the reference has to clarify the secondary literature source, too, by adding the note "Cited by ...".

The citation must be as clearly identifiable as possible. Still, specifying the page numbers is unnecessary, unless the work is cited only partially and not entirely (e.g. a particular method or a single section). If the corresponding reproduction is related to more than one page of the quoted work, this should be visible in the page reference, e.g. by correspondingly reproducing another author's method from two pages "p. 9 et seq." and more than two pages "p. 9 et seqq. "or e.g., "p. 9-14 ".

5.3   Quotation and Citation Format

Quotations or citations have to be indicated by a reference. For this purpose, there are various styles; in the sections below we will take a closer look at the APA and Havard styles in order to give you some examples. No matter which of the offered styles you choose, please keep in mind that it is of utmost importance to apply the selected type in a consistent manner (c.f. Section 3.3.).

5.3.1   Example 1: APA In-Text Citation Rules[4]:

APA in-text citations contain the author's/authors name/names and the year of publication:

Website or single author:

- Wiktionary.org states "…" OR "…" (Wiktionary.org, accessed on DD.MM.YYYY)
- Mitchell (2017) states "…" Or "…" (Mitchell, 2017).

Direct Quote: The citation must follow the quote directly and contain a page number after the date, for example (Mitchell, 2017, p.104). This rule holds for all of the variations listed.

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[4]   For more information and further examples on APA-Style, please see: https://www.mendeley.com/guides/apa-citation-guide

Parenthetical: The page number is not needed.

Two or three authors:

- Mitchell and Smith (2017) state "…" Or "…" (Mitchell & Smith, 2017).

Three or more authors:

- Mitchell, Smith, and Thomson (2017) state "…" Or "…" (Mitchell, Smith, & Thomson, 2017).
- Mitchell et al (2017) state "…" Or "…" (Mitchell et al, 2017).

Authors with multiple works from one year:

- (Mitchell, 2017a) Or (Mitchell, 2017b)

Authors with multiple works in one parenthesis:

- Mitchell (2007, 2013, 2017) states "…" Or "…" (Mitchell, 2007, 2013, 2017)
- (Mitchell & Smith 2017; Thomson, Coyne, & Davis, 2015).

5.3.2   Example: Havard In-Text Citation Rules[5]:

In Harvard referencing, in-text citations contain the author(s)'s or editor(s)'s surname, year of publication and page number(s).

Website or single author:

- Wiktionary.org states "…" OR "…" (Wiktionary.org, accessed on DD.MM.YYYY)
- Mitchell (2017, p. 189) states "…" Or "…" (Mitchell, 2017, p. 189)

Two or three authors:

- Mitchell, Smith and Thomson (2017, p. 189) state "…" Or "…" (Mitchell, Coyne and Thomson, 2017, p. 189)

Four or more authors:

- Mitchell et al (2017, p. 189) state "…" Or "…" (Mitchell et al, 2017, p, 189)

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[5]   For   more   information   and   further   examples   on   Havard-Style,   please   see: https://www.mendeley.com/guides/harvard-citation-guide

5.3.3   Other Citation Rules[6]:

Other well-known citation rules are, i.e.:

- Vancouver (numerical system)
- Chicago A (footnote- and endnote-system)
- Chicago B (author-publication date-system)
- MLA8 (author-page-system)
- The German Citation Style (footnote-and endnote-system)

For reasons of instant visibility, the IWI prefers citation rules adhering to the author-publication date-system. Therefore, we would like you to refrain from footnote-and endnote-systems or numerical systems. Nevertheless, a consistent and sound usage of such a sisten will, of course not lead to a reduction in evaluation points. A full reference, as it is given in the bibliography, should be avoided in the text, too.

5.4   Bibliography

In the bibliography all sources are specified, which are referred to within the text (and only these!). The list of references should only include works that are cited in the text and that have been published or accepted for publication. Personal communications and unpublished works should preferably be mentioned in the text (exceptions are possible: Personal Communication). Key principles should be the completeness of all references and their searchability. If you use LaTex for writing your thesis, BibTex (and Zotero) will be a tremendous help for you in creating your bibliography.

Nevertheless, also - and especially - automatically created references need consistency-checks. As seen in Section 5.3, please adhere to the chosen style (preferably an author-publication date-system) when it comes to arranging the single reference elements.

5.4.1   Order of References

Your references should be classified in alphabetical order by author or publishers. Reference list entries should be alphabetized by the last names of the first author of each work. Please alphabetize according to the following rules: 1) For one author, by name of author, then chronologically; 2) For two authors, by name of author, then name of coauthor, then chronologically; 3) For more than two authors, by name of first author, then chronologically. Several publications by the same author should be classified according to their year of publication. If the same author(s) published multiple publications in the same year, these works are distinguished by a lower case letter after the year, e.g.: (1972a), (1972b), etc. An example how to classify correctly:

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6 For more information and further examples, please see: https://www.scribbr.de/richtig-zitieren/uebersicht-zitierstile/

- all publications of Domschke,
- all publications by Domschke, co-author (sorted alphabetically by co-author).
- those of Domschke et al. (sorted chronologically)

If the secondary authors of a second-in-year-publication differ from those in the first-year publication, the reference is, nevertheless, differentiated by lower case letters:

- Domschke, Drexl, Schildt, Scholl, Voss (1995a),
- Domschke, Scholl, Voss (1995b).

5.4.2   Elements within a Reference

The individual elements contained in a reference entry in the text and in the bibliography are to be taken directly from the source. If available, please always include DOIs as full DOI links in your reference list (e.g. "https://doi.org/abc"). Please include the following elements for the following literature categories:

Books:

- Surnames and (initials of all) first names (hyphens are preserved) of all authors; alternately all editors (without academic degrees and titles)
- Year of publication (four digits; if no year is given, this is indicated by "n.d.")
- Title of the work
- Publisher
- Publishing location (if there are more than two publishing locations, you can limit yourself to the first one, possibly supplemented by "i.a"
- Volume, edition (if more than one edition has been published)
- Page numbers (if the book is only cited in parts)
- DOI

Papers from (e-)Journals

- Name and (initials of all) first names of all authors (as with books)
- Title of the paper
- Title of the journal
- Volume number
- Issue number
- Year of publication (as for books)
- Page numbers of the paper
- DOI

Papers or chapters in Collected Editions

- Name and (initials of all) first names of all authors (as with books)
- Year of publication (as for books)
- Title of the chapter/paper
- "In:" Surname and initials of all first names of all publishers (as for books), followed by "(eds.)".
- Title of the. collected edition
- Volume, edition, publisher, place of publication (as for books)
- Page numbers of the paper/chapter
- DOI

Other Internet Sources (not e-Journals):

- Author (if the author cannot be identified, use: ", n. a.")
- If there is no author, the article title comes first
- Article title of website (if there is no title, use: ", n. t.")
- Publication date (if there is no publication date, use: ", n. d.")
- Domain-name of website (e.g. Wikipedia.de or Wikipedia.com)
- Access date (DD.MM.YYYY)
- Entire URL

5.4.3   Example 1: APA Style

Author Rules:
1. Initials are separated and ended by a period eg Mitchell, J.A
2. Multiple authors are separated by commas and an ampersand eg Mitchell, J.A., Thomson, M., & Coyne, R
3. Multiple authors with the same surname and initial: add their name in square brackets eg Mendeley, J. [James].

Date Rules:
1. Date refers to date of publishing
2. If the date is unknown 'n.d' is used in its place eg Mendeley, J.A. (n.d)

Title Rules:
1. The format of this changes depending on what is being referenced.

Author's surname, initial(s). (Date Published). Title of source. Location of publisher: publisher. Retrieved from URL

Publisher Rules:
1. If in the US: the city and two letter state code must be stated eg San Francisco, CA
2. If not in the US: the city and country must be stated eg Sydney, Australia

Please put the DOI here (if possible)
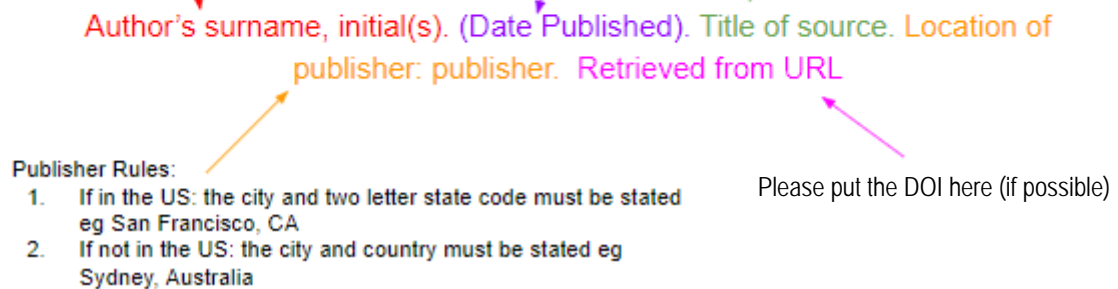
Fig. 1: Core Components of an APA Reference[7]

5.4.4   Example 2: Havard Style

Author Rules:
1. Surname first followed by initials eg Mitchell, J.A.
2. No Author: if the work is association with an organisation, use their name. Otherwise exclude the author name section
3. 2 Authors: authors are added in the same format as the first with 'and' or a comma in between eg Mitchell, J.A. and Thomson, M.

Date Rules:
1. If date is unknown, use '(no date)'

Title Rules:
1. This is italicised if referencing the whole works (eg a book) is used
2. This is put between single quotation marks if a part of a whole works is being used (eg a chapter)
3. Only the first letter of the title is capitalized

Author surname, author initials. (Year Published). *Title*. Edition. City: Publisher, Numbers.

Numbers Rules:
1. This refers to different things for different sources: could be page numbers, volumes, issue numbers etc

Please put the DOI here (if possible)

Edition Rules:
1. This is only included for second or later editions.
2. Edition is written as ##edn.

Publisher Rules:
1. Only the city of the publisher is needed, not the country or state
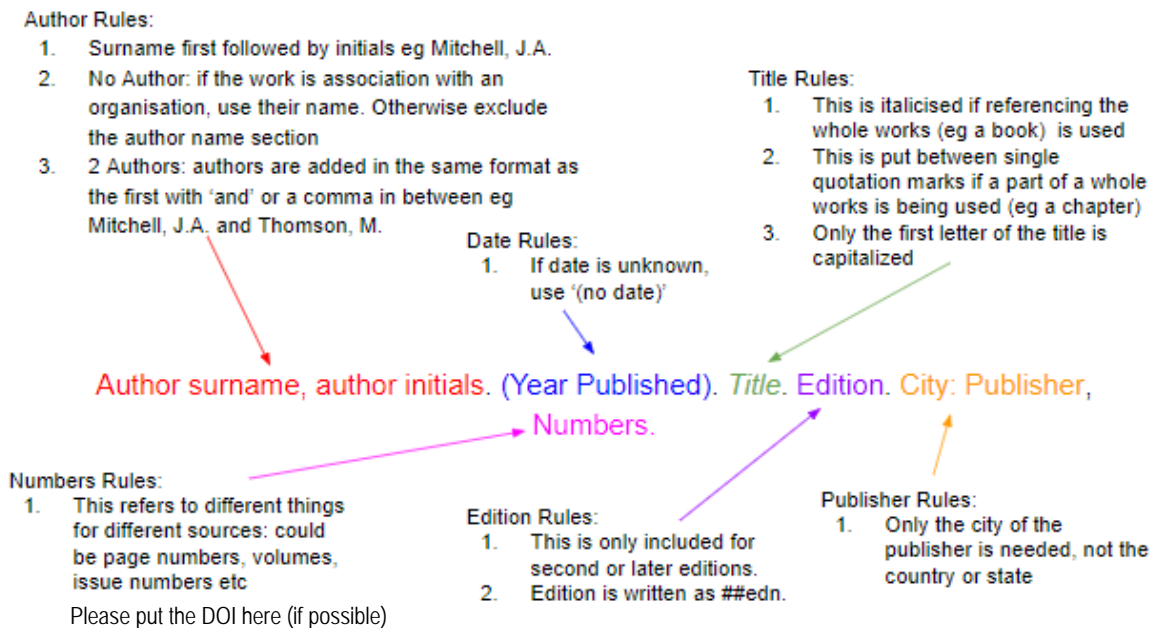
Fig. 2: Core Components of a Reference: Havard[8]

At this point, the statements in section 3.3 apply also. A consistent presentation is particularly important in those cases that are not mentioned. This concerns, for example, the format of the references (bold, italics, i.a.) as well as making the single elements of the citation distinguishable (such as author, title, publisher, place of publication, etc.) by commas, dots or colons. There is also a certain kind of freedom for enumerating several authors or publishers within a scientific work, which should be implemented in a consistent and uniform way[9]. For more information on this, we again advise you to have a look at the following website: https://www.mendeley.com/guides/citation-guides

Again, we want to emphasize that each and every kind of scientific work is and will be subject to a detailed plagiarism evaluation. A sound differentiation between self-created and cited/quoted contents is the fundament for a successful scientific piece of work and, therefore, for a positive evaluation of the latter. If plagiarism is verifiable, the thesis can be evaluated with the German grade "magelhaft": 5,0.

6   Appendix

Please find our LaTex- und MS Word templates for bachelor and master students of Information Systems on our website at: https://www.bwl.uni-

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[8] Source: https://www.mendeley.com/guides/ultimate-citation-cheat-sheet

hamburg.de/iwi/studium/abschlussarbeiten.html. Students from other study programs: please inform yourself at your local student office which templates you should use.

6.1 Affidavit

At the end of your thesis it is mandatory to state an affidavit. Please check the examination regulations of your specific study program to find the regulations for your affidavit. If there are no such regulations, please use a wording close to the following:

I hereby declare that I wrote this thesis on my own and without the help of any third party or the use of any other than the cited sources and tools. I also confirm that all texts that I copied directly or in their sense are marked and cited as such.

Hamburg, month year   …<signature>