

Eliisa Jauhiainen & Maritta Pirhonen

## **REPORTING GUIDELINES**



UNIVERSITY OF JYVÄSKYLÄ  
DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS  
2010

## ABSTRACT

Jauhiainen, Eliisa

Pirhonen, Maritta

Reporting guidelines

Jyväskylä: University of Jyväskylä, 2010, 28p.

Information systems science/Computer science, reporting guidelines

Clear instructions on writing and formatting a report can significantly support the writing process of various types of academic reports, such as Bachelor's theses, Master's theses and written course assignment reports. This document presents the guidelines for the above mentioned reports in the Department of Computer Science and Information Systems at the University of Jyväskylä.

These guidelines present the standard requirements of the Department and any exceptions require a clear rationale. The main goal is to support both the authors and the supervisors of the theses and course assignment reports.

The development process of this guide was informed by a literature review, as well as discussions with the departmental staff who supervise written reports and theses. The main end-result of this guide is to act as a single, unified presentation on how reports and theses are to be constructed in the Department of Computer Science and Information Systems. Furthermore, a template for written reports containing the required formatting is presented in this document. The template is also available on the departmental website at: <https://www.jyu.fi/it/laitokset/cs/opiskelu/ohjeita-opiskelijoille/tutkielmat>.

Keywords: thesis, report formatting, guidelines

## TIIVISTELMÄ

Jauhiainen, Eliisa

Pirhonen, Maritta

Raportointiohje

Jyväskylä: Jyväskylän yliopisto, 2010, 28 s.

Tietojärjestelmätiede/Tietojenkäsittelytiede, tutkielmien raportointiohje

Kirjallisen raportin laatiminen helpottuu, jos noudatetaan yhdenmukaisia ja selkeitä ohjeita sekä raportin sisällön että ulkoasun suhteen. Tässä raportointiohjeessa esitetään Jyväskylän yliopiston tietojenkäsittelytieteiden laitokselle tehtävien raporttien laatimisohteet. Tällaisia raportteja ovat kandidaatin tutkielma, pro gradu -tutkielma sekä harjoitustyöraportit. Tämä raportointiohje on laitoksen standardi, josta poikkeaminen edellyttää aina perustelua. Päätaavoitteena on tukea sekä raporttien kirjoittajia että heidän ohjaajiaan.

Tämän raportointiohjeen muodostamiseksi on perehdytty vastaaviin kirjallisiin ohjeisiin sekä keskusteltu laitoksella kirjallisten raporttien ja tutkielmien parissa työskentelevien henkilöiden kanssa.

Raportointiohjeen keskeinen tulos on yhtenäiseksi esitykseksi koottu ohjeistus tutkielmien ja raporttien kirjoittamiseen. Raportointimallipohja, johon on asemoitu valmiiksi tässä ohjeessa esitetyt raportin asetteluohjeet löytyy osoitteesta <https://www.jyu.fi/it/laitokset/cs/opiskelu/ohjeita-opiskelijoille/tutkielmat>.

Asiasanat: tutkielma, tutkimusraportti, harjoitustyö, kirjoitusohjeet

## **FIGURES**

|   |    |
|---|----|
| FIGURE 1 The side margins of a thesis ..... | 14 |
| FIGURE 2 Small hedgehog with one leg.....   | 15 |

## **TABLES**

|                                 |    |
|---------------------------------|----|
| TABLE 1 Example of a table..... | 15 |
|---------------------------------|----|

## TABLE OF CONTENTS

|   |    |
|---|----|
| ABSTRACT .....  | 2  |
| TIIVISTELMÄ .....   | 3  |
| FIGURES .....   | 4  |
| TABLES .....  | 4  |
| TABLE OF CONTENTS.....  | 5  |
| 1 THESIS - WHAT IS IT? .....                                  | 6  |
| 2 BASIC STRUCTURE OF A THESIS.....                            | 7  |
| 2.1 First part .....  | 7  |
| 2.2 Main part - Body.....                                     | 9  |
| 2.3 Final part.....   | 12 |
| 3 STYLE AND LANGUAGE .....                                    | 13 |
| 3.1 Formatting instructions and text content .....            | 13 |
| 3.1.1 Fonts and margins.....                                  | 13 |
| 3.1.2 Titling and paragraphs .....                            | 14 |
| 3.1.3 Page numbering .....                                    | 15 |
| 3.1.4 Figures .....   | 15 |
| 3.1.5 Tables .....  | 15 |
| 3.2 References.....   | 16 |
| 3.3 Formatting guidelines for the first part of a thesis..... | 17 |
| 3.4 Tenses.....   | 18 |
| 3.5 Abbreviations.....  | 18 |
| 4 ON WRITING A THESIS .....                                   | 19 |
| 4.1 Writing technique.....                                    | 19 |
| 4.2 Information retrieval.....                                | 19 |
| 4.3 Literature for research methods.....                      | 21 |
| 5 CONCLUSION .....  | 22 |
| REFERENCES.....   | 23 |
| APPENDIX 1 PRESENTATION OF SOURCE INFORMATION.....            | 24 |
| APPENDIX 2 CHECKLIST FOR AUTHOR AND OPPONENT OF A THESIS ..   | 26 |

## 1 THESIS - WHAT IS IT?

A thesis is a demonstration of expertise and at the same time also shows the student's ability to use language. When writing a thesis, the student learns how to analyse their own thoughts and to organise knowledge previously known. Writing a thesis gives one the experience of systematic working.

Furthermore, it is in thesis's nature that - unlike other scientific research - it is assessed. A thesis is expected to have congruence between its structure and manner of representation, and there are requirements for its style of writing.

The purpose of this guide is to support the student in turning their study into a written thesis which is then assessed. The guide is primarily designed for students but it provides useful information for supervisors of theses, too. The guide includes an overview of the structure of a thesis from the title page to the bibliography, information on the style and the linguistic form of a thesis as well as information on writing. Theses written at the Department of Computer Science and Information Systems should carefully follow these guidelines. The guidelines given for style and linguistic form can be also applied to written course assignment reports at individual courses. This presentation does not focus much on the actual writing process. Guidelines for writing as a process can be found e.g. in Swales and Feak (1994).

The guidelines themselves are included in the next four chapters. Chapter two covers the basic structure of a research report discussing its central elements. The next chapter presents matters related to writing techniques. The fourth chapter presents the way in which a bibliography of a research report is constructed. The last chapter briefly introduces writing techniques and gives tips on research method literature.

## 2 BASIC STRUCTURE OF A THESIS

The basic structure of a research report is the same regardless of the thesis's content. The structure consists of three parts: the first, introductory part; the body that contains the main text and the final part. There are strict rules for the formatting of the pages constituting the first part both in terms of how the content is presented and the page order. The body is the longest part of a research report. The final part is placed – like its name suggests – in the end of the report.

Next, all the previously mentioned three parts of a research report are presented. The title page, abstracts and tables of contents, which belong to the first part, have been provided in the template of a research report, which can be found on the web page of the Department of Computer Science and Information Systems <https://www.jyu.fi/it/laitokset/cs/opiskelu/ohjeita-opiskelijoille/tutkielmat>.

### 2.1 First part

The first part of a thesis contains the title page, the abstracts, a list of abbreviations, figures and tables that the research contains as well as the table of contents. The abstract is written both in English and in Finnish. If the thesis is in English, the English abstract is placed before the abstract.

#### **Title page**

The title page gives readers the first impression of the thesis. It includes the names of the author, the thesis and the organisation (Jyväskylän yliopisto). The name of the thesis is very important: based on the name the reader decides whether they are interested in the work or not. It has to be informative and tight as well as in tune with the definitions and focuses of the content. The nature of a thesis can be made more explicit with an extension in the name. Naturally, the name must contain the central keywords.

## Abstract

The abstract summarises shortly but accurately the essential part of the thesis, its research methods, purpose and findings. The aim of the abstract is to give the reader a more specific idea of the thesis's content.

The abstract consists of two parts: bibliographical information and the main abstract. The bibliographical information includes the author's information; the title, place and number of pages in the research report; the type of the thesis and the name of the supervisor. The type of the thesis refers to whether the research report is for example a bachelor's or master's thesis. The bibliographical information is presented in the following form:

First author (Last name, First name)

Second author (Last name, First name)

Name of the research report

Place of publication: Publisher, year of publication, number of pages

Major subject and type of the research report (for example Computing, master's thesis)

Supervisor(s): Last name, First name

For example, the bibliographical information on the research report on the abstract page of Sari Kuukkanen's master's thesis would be written in the following way:

Kuukkanen, Sari Anneli

Risk Identification in the Scrum Process

Jyväskylä: University of Jyväskylä, 2008, 104 pp.

Information Systems Science, master's thesis

Supervisor: Pirhonen, Maritta

The main abstract comes after the bibliographical information and it should give the reader an idea of the research's content. The abstract should also be understandable without the original text, since based on it the reader decides whether the work is worth a closer look.

The abstract should explain the purpose and subject of the research, research methods used as well as the findings and conclusions. The abstract should be brief and accurate, independently understood, consistent and written in complete sentences. The language should be based on the terminology used in the research. The style should be declaratory and written in past tense. No tables, figures, unestablished abbreviations or references should be used.

Three to seven keywords describing the research subject should be written after the abstract. The whole abstract must fit on one page and its length is about 250 words. The abstract is also written in Finnish on its own page.

## The list of figures and tables

After the abstracts the figures (title: FIGURES) and tables (title: TABLES) used in the report are listed. The research report template has models for the lists and they can be used for editing the lists of the figures and tables. If a research report does not have any figures or tables, this page is not added onto the beginning of the report.

## **Table of contents**

The table of contents is placed after the lists of figures and tables in a research report. The table of contents begins with the title TABLE OF CONTENTS. The table of contents consists of titles for the chapters and sections, of the related numbering and page numbers. It also covers the bibliography and mentions the appendixes. The following things are worth noting when constructing a table of contents:

- Does the table of contents cover the thematic entity expressed in the thesis's title?
- Do the titles show the purpose and logical progress of the text?
- Can the name of the work be deduced from the titles?
- Is the entity tight and logical?
- Are there enough of titles? Are all the titles needed?
- Does the titling reflect the length of the text parts?
- Does every subheading clearly relate to its main heading?
- Are there at least two subheadings under each main heading? Subheadings are not necessary, but if there are some, there must be at least two.
- Are comparable things expressed in same or at least in similar linguistic forms (in subheadings)?
- Make sure that none of the titles is exactly the same as the name of the whole text or is not too similar to it.

The hierarchical structure of the different text parts are illustrated with scaling. The content is to be outlined so that the hierarchical structure is balanced. An example of a table of contents is the table of contents of this guide. When planning the thesis's content, it should be remembered that a chapter cannot only have one subheading, but it must have at least two. More on headings and titles can be found in section 3.1.2.

## **Index of concepts**

If there is a great amount of different concepts and/or abbreviations in the thesis's subject matter, an index of concepts used can be placed in the first part of the thesis after the table of contents. Concepts used are listed in alphabetical order. The title of the index is INDEX OF CONCEPTS.

## **2.2 Main part - Body**

The body of a thesis contains the main text of the research report. It consists of an introduction, a research question, a discussion part, the results and their examination as well as the bibliography. The first chapter in a research report's body is the introduction, which motivates the reader to the subject. After the introduction the chapters presented are thesis-specific. These chapters contain previously done research

related to the subject as well as in a master's thesis a chapter that describes how the research was carried out and for example what kinds of methods were used.

Each chapter begins with an introductory paragraph that familiarises the reader with the upcoming content. It expresses how the chapter will help the research reach its overall goal. A summary can be written in the end of a long chapter. It collects the central conclusions together and evaluates their meanings. Based on the conclusions it can also "look forward" and bring up matters or questions that have not yet been discussed. The most important thing is that from the body text the reader is able to understand the "main point" of the thesis, in other words how the texts relate to each other. The second appendix (appendix 2) of this guide is a checklist to help with writing the body.

## **Introduction**

The introduction first briefly describes the background and problems of the research, its purpose and need and reasons for them, targets, research method and finally the findings and their meaning. It is a good idea to replace the title of the introduction with a more illustrative and accurate name. The reader must be able to understand what the study is about and why and how it was done. By describing the background of the research, its subject, its concepts and the approach to the problems are presented to the reader. The main definitions and standpoints can be illustrated at the same time. Central concepts of the research are usually defined in the introduction. If some of the central concepts are defined only in the following chapters, the introduction describes the concepts generally.

Research always intends to find a solution to one or more practical or theoretical problems. The purpose(s) of the basic research must be presented briefly and clearly in the form of an interrogative clause(s). These purposes must be clearly brought up in the introduction.

How the results are described depends on the type of the research. For example a research that is only based on literature describes how it differs from other similar presentations. In an empirical study the discoveries and conclusions made are mentioned. In constructive research the construction created (developed language, built system) is shortly described. It is especially worth paying attention to the things the author themselves finds central, original or new in their work. The end of the introduction presents the content outline of the next chapters. The introduction is, together with the conclusions, the most difficult and central chapter in the whole thesis. Because of this, a great deal of attention should be paid to the finishing of the introduction.

The purpose of the introduction is to give a realistic picture of what there is to be expected from the other parts of the research report. Usually the introduction must be rewritten at least three times. It is wise to write the final draft of it either simultaneously with the examination part or in the very end.

The main challenges of an introduction are usually the excessive length, the difficulty to motivate the reader and explain to them what the research will be about as well as general unclarity (e.g. the purposes of the research do not become clear from the introduction). The length of an introduction is on average two to four pages.

## **Method**

In a master's thesis the research method used as well as the research process can be presented in one of the body's chapters. The method part describes what was done in the research and how the research was carried out. The chapter can also present the theoretical background of the research and the possible subtext.

## **Results and conclusions**

This chapter reports the findings of the research by presenting the answers for the research problems. All research problems must be discussed, even if the research has not found answers for them. It is a good idea to present the results also in the form of tables and figures that are explained in the text part. The figures and tables are referred to before they appear in the text.

## **Discussion**

In the discussion part of a research report a clear image of results and their meanings is built. The results are proportioned to the background literature and the purpose of the research based on it. This kind of content has been written in the thesis earlier (for example in chapter "Results and conclusions"). Accordingly, the author must remember that the analysis of the research is not to be left to the summary of the thesis.

In the discussion (in contrast to the introduction) the author can assume that the reader is already familiar with the work and therefore the presenting of the results must be critical, reflective and progressive. The approach to the problems and the goals are repeated. The research methods and findings are presented in a summarised form. In this context the author's own contributions should be clearly brought up. The text should also bring up the ways in which the results differ from or support previously got results. In addition, the results are required to be criticised by for example showing what kinds of limits must be set for generalisation of the results and what kinds of problems have not been examined in great detail. Topics for further research are presented in the end. Normally the discussion chapter is 2-3 pages long.

Thus, the writer presents the most important facts four times: in the abstract, introduction, content chapters and the conclusion. The view point and level vary naturally in different contexts. The principles regarding challenges of writing are the same as for the introduction.

## **Bibliography**

The bibliography has three functions. It lists all sources that are referred to in the text. The bibliography is also meant for giving the reader a picture of the literature used for the work. Thirdly, the bibliography helps those interested in the subject to search for literature.

Accordingly, the quality of the bibliography should be paid attention to, and a generally known "standard" should be used. Different publications use different ways of writing down the sources. The most important thing is that the markings are thorough and congruent with each other. Our department follows the Publication Manual of the American Psychological Association's (APA) standard.

The most common source material types are (see appendix 1)

1. Articles
2. Books
3. Reports and committee deliberations
4. Presentations from meetings and conferences
5. Dissertations and master's theses
6. Audio-visual material and electronic media.

The sources are written down in the alphabetical order according to the authors' names. Publications by same author(s) are organised by times of publications from oldest to newest. Publications from the same year are written down in the alphabetical order according to their names and are followed by the publication year with a,b,c,... distinguishing them from each other. When writing a bibliography, it is worth using systems created for reference management such as RefWorks (<http://www.refworks.com/>) or Zotero (<http://www.zotero.org/>).

## **2.3 Final part**

The final part of a research report includes the bibliography and possible appendixes. Appendixes are materials that are not needed in the actual text for making it understandable but are referred to. All numerical data and documents that would make the text heavy and hard to read should be moved to Appendixes. For example, in an empirical study, surveys are presented in the Appendixes. Also complex figures that are not treated in detail in the text are presented in the Appendixes. Appendixes are numbered in consecutive numbers and titled appropriately (e.g. APPENDIX 1 PRESENTING SOURCE INFORMATION). When referring to an appendix in the text, its number (for example see appendix 1) is used, not page number.

## 3 STYLE AND LANGUAGE

This chapter consists of detailed instructions on style and language of a thesis. First it presents instructions on formatting: side margins, fonts and instructions for titling and text paragraphs. Principles of tenses in scientific text are also presented, as well as abbreviations that must be added in a research report when necessary. The styles of a thesis can be found in the template on the department's web page.

### 3.1 Formatting instructions and text content

The dissertation template of the University of Jyväskylä (see <https://www.jyu.fi/thk/ohjeet/tutoriaalit/julkaisukuosiin/otsikkotyyli>) is used in theses, excluding a few exceptions. In the template for the Department of Computer Science and Information Systems' bachelor's and master's theses the formatting is ready-made. It must not be changed when writing the thesis. However, the most important thing is that in a finished thesis margins are in accordance with the instructions. The template for theses can be found from the department's web page (<https://www.jyu.fi/it/laitokset/cs/opiskelu/ohjeita-opiskelijoille/tutkielmat>).

#### 3.1.1 Fonts and margins

Book Antiqua font is used in a thesis. If a word processing programme does not have the font, a comparable font such as Palatino must be used. These instructions are written in Book Antiqua. The basic font size is 12 points and line spacing 1. Side margins are illustrated in figure 1. The left margin, right margin and top margin are 3 cm, the bottom margin 2.5 cm. The side margins have already been set in the thesis template.

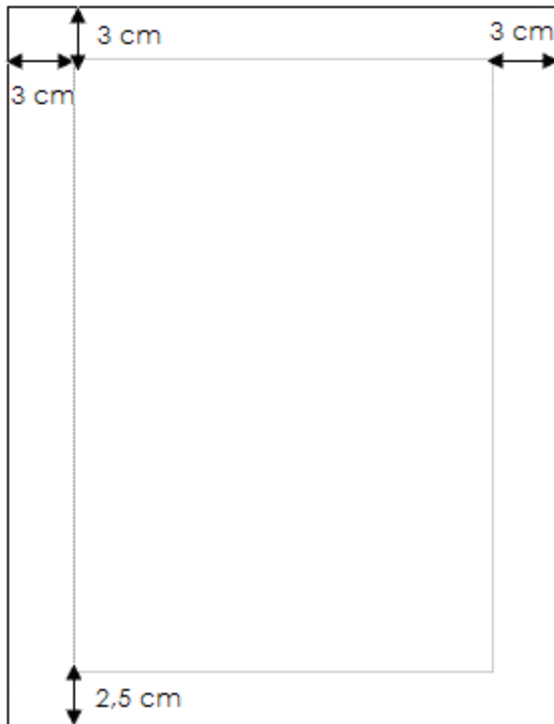


FIGURE 1 The side margins of a thesis

### 3.1.2 Titling and paragraphs

Titles are numbered hierarchically in a thesis. There can be no more than three title levels. A new chapter that is begun with a main heading always starts on its own page. The main heading is written in bold capital letters, font size 16. There is no full stop after a main heading's number. Accordingly, a main heading looks like the following:

## **1 FIRST MAIN HEADING**

Subheadings are written in bold lower-case letters, font size 12. There must be at least two subheadings of same level. If a thesis has a subheading 2.1, it must also have a subheading 2.2. The spacing both before and after a subheading is 18 points (pt). Subheadings are numbered so that there is no full stop after the last title number. The following is an example of a subheading:

### **2.4 Subtitle in chapter two**

Paragraphs are justified from both sides and hyphenated when necessary. Hyphenating is used in order to avoid too long spaces between words on a line. Although the word processing programme offers automatic hyphenation, the author must always check that it is correct and if necessary, correct possible errors. The recommendation is that a paragraph is at least three lines long (the third line does not have to be full-length).

### 3.1.3 Page numbering

Page numbering is started from the title page and continued uninterrupted to the last page with text in it. Thus, also the bibliography and appendix pages are included in the uninterrupted page numbering. The first page number is not marked until on the second page of the Introduction page. Page numbers are marked in Arabic numbers on the top middle of the page with no other symbols.

In MS Word, page numbering can be done by separating the title page and the following abstracts and tables of contents from each other by section break. Page numbering is then set up on each part so that the number is not shown on the pages belonging to the first part. Like this, the page number will not be shown until on the second page of the Introduction chapter. The template of a research report already has page numbering.

### 3.1.4 Figures

A figure is always referred to in the text before the figure itself is presented. For example a reference to figure 1 looks like this: (figure 1). The figure is placed as close to the reference as possible, preferably on the same page. Figures are numbered uninterrupted from the beginning of the work. The definition text of the figure is written in font size 10.5. The definition text is placed under the figure so that there is no line feed between the text and the figure. Two spaces between lines (28 pt) are left before the main text continues after the name of the figure. The main text that starts from under the figure is begun without indentation. Next, an example of a figure (figure 2).



FIGURE 2 Small hedgehog with one leg

Figures must be in same language as the text of the research report. If the report is written in English, all figures must also be in English. Figures can be in colour, but they must also be clear in black and white.

### 3.1.5 Tables

Tables are numbered uninterrupted from the beginning of the work. Each table must be referred to in the text before the table is presented. The table and its definition text must be understandable without having to read the actual text.

The definition text of a table is placed on top of the table. Next, an example of a table (table 1).

TABLE 1 Example of a table

| Type of documentation    | Memo            | Invoice |
|--------------------------|-----------------|---------|
| Logo of the organisation | Does not appear | Appears |
| Contact information      | Appears         | Appears |

Two spaces between lines (28 pt) are left before the name of the table as well as after the table before the beginning of the main text. If a table must be continued on the next page, “(to be continued)” is written on the right bottom of the page in brackets. The number of the table and “(to be continued)” are written on the left top of the next page, for example Table 5 (to be continued). Pages must be written as full as possible. The text in a table is written in font size 10.5 and line spacing is 1.

References to tables in the text are done in numbered references, for example (table 2), so the text continues regardless of the table. Accordingly, a table can be moved onto the next page if it does not fit into the space left on the current page. When referring to numbering in the text, there is no full stop after the index number. The main text that starts from under the table is begun without indentation.

### 3.2 References

When referring to earlier research on the topic area, references are used. The author’s own findings and thoughts are separated from others’ findings and thoughts by references. A reference must tightly correspond with the bibliography so that the reader can easily find the right place from the bibliography.

A reference is distinguished from the main text with brackets. The original author’s second name and the year of publication are written in the brackets. The name and the year are separated with a comma. For example, a reference to Elisa Jauhiainen’s master’s thesis would look like this: (Jauhiainen, 2005). If there are two authors, the names are separated with the symbol &. For example, a reference to this guide would be: (Jauhiainen & Pirhonen, 2010).

If the original source has three or more authors, all names separated with a comma are written in the first reference: (Jauhiainen, Pirhonen & Silvennoinen, 2009). When referring to the source for the second time, it is enough to write the first author’s name and “etc.”, a comma and the year: (Jauhiainen etc., 2009).

If a source has six or more authors, also the first reference is (Jauhiainen et al., 2009). If the text refers to several publications of the same author from the same year, the sources are separated with alphabet a, b, c, etc.

For example, if a thesis refers to two articles written by Pirhonen in 2010, the references are distinguished like in the following: (Pirhonen, 2010a) and (Pirhonen, 2010b). If the name of the writer is part of the text, only the year and page numbers are written in the brackets: “According to Jauhiainen, Pirhonen and Silvennoinen (2009)...” In this case the symbol & is replaced with the word and.

If a reference is placed before the full stop of a sentence, the original source is only referred to in that one sentence. If a reference is placed after the full stop of a sentence, it is referred to in several sentences before that. In that case the reference will also have a full stop in the brackets like this: (Jauhiainen, 2009.) An original source is not mentioned in the bibliography if it has not been used directly. In the next example Lyytinen’s article is a secondary source that discusses Keili’s original article: According to Lyytinen (2009, 16), Keili (2005) defines...

One way of referring is *summarising*, which describes the main idea of the original source in the author’s own words. A direct quotation, on the other hand, is a direct quotation from the original text, including possible factual and grammatical er-

rors. Direct, no more than three line long quotations are placed in the text and in quotation marks. For example, a direct quotation from Eliisa Jauhiainen's master's thesis would look like this: "Where Maler & El Andalouss' method concentrates on documents and components found in them, RASKE method provides means also for analysis focusing on beyond documents (Jauhiainen, 2005, p. 41)."

Longer quotations require a 1 cm long indentation from the left hand side of the main text. In that case no quotation marks are needed. This kind of quotation is written in font size 10.5 and line spacing is 1. The source and the page number of a direct quotation must always be mentioned. An example of this is the following:

The qualitative study approach is considered an appropriate method when little is known about the phenomenon under investigation and the concepts are immature due to lack of theory and previous research and a need exists to explore and describe the phenomena. (Creswell, 1994, pp. 145-146),

The main text after a longer quotation is begun without indentation. Also with direct quoting of figures and tables the page number of the reference must be marked, if the original source uses page numbering. This is also done when the language of the table or figure is translated to another language.

### **3.3 Formatting guidelines for the first part of a thesis**

If a research report is not written according to the official template of the department, here are the formatting guidelines for the title pages and table of contents:

#### **Title page**

Author's name: about 11 cm from the top of the page, font size 12.

Name of the research report: about 12.5 cm from the top of the page (1.5 cm down from the author's name). Font size 16.

Torch logo: The bottom of the torch logo is 11 cm down from the name of the research report, 5.5 cm from the bottom of the page. The logo's size is 2.7 cm.

Information on the organisation: Line spacing 1. "UNIVERSITY OF JYVÄSKYLÄ" is written in capital letters, Palatino Linotype font, font size 12. "DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS" and the year are written in capital letters, Palatino Linotype font, font size 10. The year's distance from the bottom of the page is 2.5 cm.

#### **Table of contents**

Line spacing in the table of contents is 1.

Titles of the first level: 3 cm from the page's left edge. Space before the title: 14 pt.

Titles of the second level: Indented 1 cm from the title of the first level, i.e. 4 cm from the page's left edge.

Titles of the third level: Indented 1 cm from the title of the second level, i.e. 5 cm from the page's left edge.

Font size in the table of contents: 12 pt.

### **3.4 Tenses**

Present tense is the main tense in a thesis. For example definitions of concepts, statements, presentations of theories and references to figures and tables in the research report are expressed in present tense.

Simple past tense (or "imperfect tense") is used when referring to previously published studies as well as to progress and results of the research in question. Present perfect can sometimes be used similarly to simple past tense. Past perfect is used when describing a moment, occasion or process in the past (e.g. Pirhonen had already studied the issue in 1990s, but had had to leave...). Present tense is normally used in all parts of a research report except in conclusions. Conclusions are usually written in present perfect.

### **3.5 Abbreviations**

Abbreviations are not normally used in reports and theses. Abbreviations must be used sparingly because they make a text disorderly. Abbreviations in capital letters should be avoided. If they are used, they must be presented in the non-abbreviated form the first time they come up in the text and in each chapter they appear: object-orientated programming (OOP).

## **4 ON WRITING A THESIS**

This chapter gives information on writing techniques and information retrieval for writing a thesis. The information retrieval part mainly gives a list of the most important sources for research and data collection methods.

### **4.1 Writing technique**

The reader must be able to understand the author's thoughts effortlessly, quickly and unambiguously. All unimportant words and details are to be cut out of the text. To make the text clearer, it is worth being paying attention to sentence structures.

Sentences must not be too long or complicated. They should also be of different length and have different structures (avoid using only e.g. subject predicate object). To get variation in written text, use different sentence structures such as positive and negative declaration and interrogative clauses. Avoid using "to be" as well as replacing verbs with nouns all the time. A sentence must be tight and complete. Important facts must be distinguished from unimportant ones.

Accuracy of concepts and outlining, clear sentences and appropriateness of word choices are important in a good thesis. Illustrative examples must be added on conceptually or mathematically difficult parts. By adding some redundancy into the text, the reader can be helped to understand the content: one thing can be said in several different ways.

### **4.2 Information retrieval**

The foundation of information retrieval is the approach to the problem and its definition, which must be as accurate as possible. If the topic is not specific enough, it is difficult to start looking for information. That is why it is impor-

tant to form research questions in the beginning of the research process. Different kinds of mind maps and tentative tables of context are good tools for defining the research topic. When central concepts of the topic have been defined and their meaning understood, a wider and more intensive information retrieval can begin. Defining the central concepts helps with finding good search words when looking for information from databases and networks.

Source criticism is substantially involved in information retrieval. There might be many kinds of source literature on the same topic. Pertinent criteria for choosing sources are:

- The plausibility of the source
- Review process
- How well-known the author is and what kind of authority do they have.

Source criticism is only learnt by examining source material. It is a skill that must be learnt. The author of a thesis can ask for help from their supervisor when deciding which sources to include in the research.

In computing, a significant part of source material is in electronic form. Electronic sources include for example journals and research articles published in scientific conferences. These kinds of articles are typically a part of the conference's proceedings. The rule of thumb is that articles published in scientific journals are of higher quality than the ones published in conferences. On the other hand, conference publications might publish some new research that is not yet found in journals.

The target is to use source material of as high quality as possible. In computing, important journals are for example the following:

- ACM Computing Surveys
- MIS Quarterly
- Information Systems Research (ISR)
- Human-Computer Interaction
- European Journal of Information Systems (EJIS)
- Journal of the Association for Information Systems (JAIS)
- Journal of Database Management
- Journal of IT
- Journal of Management Information Systems (JMIS)
- Information and Management
- Information & Organization
- Information Systems
- Information Systems Journal (ISJ)
- Behaviour & IT
- Data & Knowledge Engineering
- International Journal of Electronic Commerce
- International Journal of Human-Computer Studies

- Human-computer interaction
- Personal and Ubiquitous Computing (PUC)
- Interacting with computers.

Journals can be searched for through different search engines such as the NELLI-portal (<http://www.nelliportaali.fi/>) or Google Scholar (<http://scholar.google.fi/>). Journals typically also have their own websites, where their published articles can be read if they are open (most journals' material can be accessed through the university's network). The quality impact of journals in the field of computing can also be studied on the website of Association for Information Systems (AIS): <http://home.aisnet.org/>.

University of Jyväskylä's library offers useful training, such as help for information retrieval, for thesis writers. The library training skills can be found on [https://kirjasto.jyu.fi/training?set\\_language=en](https://kirjasto.jyu.fi/training?set_language=en). Guidelines for information retrieval can be found on the library's website: [https://kirjasto.jyu.fi/information-retrieval?set\\_language=en](https://kirjasto.jyu.fi/information-retrieval?set_language=en).

### **4.3 Literature for research methods**

The author of a thesis should familiarise herself with literature for research methods. There are numerous research methods and information retrieval methods for both quantitative and qualitative research (see e.g. Creswell, 1994; Wolcott, 2009). Kyösti Raunio (2010) from the University of Tampere has listed an extensive amount of literature discussing research methods (see [http://www.uta.fi/laitokset/sostyo/hlokunta/raunio/menet\\_kirjall.pdf](http://www.uta.fi/laitokset/sostyo/hlokunta/raunio/menet_kirjall.pdf)).

## 5 CONCLUSION

This reporting guide presented the way in which research reports are written at the Department of Computer Science and Information Systems at the University of Jyväskylä. The guide can also be helpful for other course assignment reports.

Chapter two presented the parts of a basic structure of a thesis: first part, body and final part. Guidelines for language and formatting were given in chapter three. The same formatting is ready made in the reporting template found on the department's website. In addition to formatting, the guide presented the use of references and creating a bibliography according to the APA standard. Finally, general instructions were given for writing a thesis. For example, tips for information retrieval and literature for research methods were given.

This guide is the standard of the Department of Computer Science and Information Systems and therefore the author must give well-grounded reasoning if they decide to deviate from these guidelines. The instructions presented are meant for authors of research reports. They can also be used by the supervisors of the works. The guide replaces all previously made similar reporting guidelines.

## REFERENCES

- American Psychological Association. (2001). *Publication Manual of the American Psychological Association*.
- Creswell, J. (1994). *Research design: Qualitative and quantitative approaches*. Thousand Oaks: Sage Publications, Inc.
- Fairbairn, G. & Winch, C. (1996). *Reading, Writing and Reasoning. A Guide for Students*. 2nd edition. Buckingham, Open University Press.
- Kuukkanen, S. (2008). *Risk Identification in the Scrum Process*. Master's Thesis in Information Systems. University of Jyväskylä.
- Swales, J. & Feak, C. (1994). *Academic writing for graduate students: essential tasks and skill: a course for nonnative speakers of English*. Ann Arbor: University of Michigan Press.
- Wolcott, H.F. (2009). *Writing up qualitative research*. 3rd edition. Sage.

## APPENDIX 1 PRESENTATION OF SOURCE INFORMATION

### (a) Article in a scientific journal

Hevner, A. R., Salvatore, T. M., Park, J. & Ram, S. (2004). Design Science in Information Systems Research. *MIS Quarterly*, 28, 75–105.

Sawyer, S. & Tapia, A. (2005). The sociotechnical nature of mobile computing work: Evidence from a study of policing in the United States. *International Journal of Technology and Human Interaction*, 1(3), 1–14.

Tyrväinen, P., Päivärinta, T., Salminen, A. & Iivari, J. (2006). Characterizing the evolving research on enterprise content management. *European Journal of Information Systems*, 15, 627–634.

### (b) Article in a compiled work

Marttiin, P. (1994). Towards flexible process support with a CASE shell. Teoksessa G. Wijers, S. Brinkkemper & T. Wasserman (Eds.), *Advanced information systems engineering, LNCS 811* (s. 14–27). Berlin: Springer-Verlag.

Majava, J. (2006). Kohti sosiaalista verkkoa. In P. Aula, J. Matikainen & M. Villi (Eds.), *Verkkoviestintäkirja* (pp. 87–97). Helsinki: Yliopistopaino.

### (c) Article in a conference proceedings

Gore, M. M. & Ghosh, R. K. (2000). Recovery of mobile transactions. Teoksessa A. M. Tjoa, R. R. Wagner & A. Al-Zobaidie (toim.), *Proceedings of the 11<sup>th</sup> international workshop on database and expert systems applications Greenwich, London, September 4–8* (pp. 23–27). Los Alamitos: IEEE Computer Society.

Nurmeksela, R., Jauhiainen, E., Salminen, A. & Honkaranta, A. (2007). XML document implementation: Experiences from three cases. In Y. Badr, R. Chbeir, P. Pichappan (Eds.), *Proceedings of the Second International Conference on Digital Information Management* (pp. 224–229). Los Alamitos, CA: IEEE Computer Society.

Pirhonen, M. & Vartiainen, T. (2007). Replacing the Project Manager in Information System Projects: What Knowledge Should be Transferred? In *Proceedings of the 13<sup>th</sup> the Americas Conference on Information Systems (AMCIS), Reaching New Heights, [CD-ROM], Keystone, Colorado, August 9-12, 2007*.

Tuuri, K., Pirhonen, A. & Varsaluoma, J. (2010). Wheel matters – Pseudo-haptic approach in designing enhanced touch screen wheel widget. In S. Dahl & K. Daniliauskaitė (Eds.), *Proceedings of International Workshop on Haptic and Audio Interaction Design 2010 vol. II* (pp. 48–50). Copenhagen: Aalborg University. 27.

### (d) Book

Rogers, E. M. (2003). *Diffusion of innovations* (5<sup>th</sup> ed.). New York: Free press.

Tuomi, J. & Sarajärvi, A. (2009). *Laadullinen tutkimus ja sisällönanalyysi* (6<sup>th</sup> ed.). Helsinki: Tammi.

### (e) Report

Mannila, M. (1985). *Instance complexity for sorting and NP-complete problems* (Report A-1985-1). University of Helsinki, Department of Computer Science.

Hintikka, K. A. (2008). *Johdatus osallistumistalouteen – internetin uusia taloudellisia toimintaympäristöjä* (Julkaisusarjan osa 32). Helsinki: TIEKE Tietoyhteiskunnan kehittämiskeskus ry.

**(f) Manual**

Tapiovaara, M. & Tapiovaara T. (2008). *Spektripaja (2.0) -ohjelman käyttöohje ja validointi*. Helsinki: Säteilyturvakeskus.

**(g) Thesis**

Jalonen, M. & Kalmari, T. (1999). *Tietotekniikan ja liiketoiminnan strategisten valintojen vuorovaikutus ja yhteensovittaminen*. Master's Thesis in Information System Science. University of Jyväskylä.

**(h) An article in an electronic periodical publication**

Airos, M. (2009). Ethics and Responsibility in ICT-Enterprises – Prospects and Challenges for Management and Leadership. *Electronic Journal of Business Ethics and Organization Studies*, 14(1), 33–42. Accessed September 21, 2010  
[http://ejbo.jyu.fi/pdf/ejbo\\_vol14\\_no1\\_pages\\_33-42.pdf](http://ejbo.jyu.fi/pdf/ejbo_vol14_no1_pages_33-42.pdf)

**(i) Electronic book**

Bacon, J. (2009). *The Art of Community*. Sebastopol, CA: O'Reilly Media. Retrieved 21.9.2010 <http://www.artofcommunityonline.org/downloads/jonobacon-theartofcommunity-1ed.pdf>

**(j) Electronic notice board, discussion list or similar**

Simons, D. J. (2000, July 14). New resources for visual cognition [Message 31]. The message sent to the discussion list  
<http://groups.yahoo.com/groups/visualcognition/message/31> 28

**(k) Web page**

Anttiroiko, A-V. (1998, 20. helmikuuta). Tietoyhteiskunta, kunnallishallinto ja demokratia. Accessed September 21, 2010  
<http://www.uta.fi/~kuaran/kunnat.html>.

McAdoo, T. (2009, 14. lokakuuta). APA Style Blog: How to Cite Wikipedia in APA Style. Accessed September 21, 2010  
<http://blog.apastyle.org/apastyle/2009/10/how-to-cite-wikipedia-in-apa-style.html>.

## APPENDIX 2 CHECKLIST FOR AUTHOR AND OPPONENT OF A THESIS

Airi Salminen (<http://users.jyu.fi/~airi>)

University of Jyväskylä

Department of Computer Science and Information Systems

14.4.2010

### 1. Research topic, research problem and defining

- Is the title clear and understandable? Does the title correspond with the context?
- Are the research topic and research problems interesting?
- Does the research have significance for research and/or practice?
- Is the research topic defined, outlined and specified clearly?
- Does the defining stay clear throughout the work?

### 2. Structure

- Are the structure and the headings clear?
- Is the structure well-balanced?
- Does the work build up a logical and well-outlined whole?

### 3. Methods

- Are the chosen methods suitable for examining the topic and solving the research problem?
- Has the choice of methods been explained?
- Have the methods been used competently?

### 4. Theory and concepts

- Have the used concepts been defined clearly?
- Has the amount of concepts been limited to suit the topic?
- Is the use of concepts appropriate?
- Does the work have a clear theoretical basis?
- Does the work analyse clearly and on appropriate grounds previous theories and concepts?
- Has the work created new concepts or theories (for example classification, subtext, model etc.)?

### 5. Choosing and using sources

- Is the used source material extensive and adequate for the topic?
- Are there enough scientific publications of high quality (mostly international conference and journal articles)?
- Have the sources been referred to and has the bibliography been built according to the instructions?
- Is every source used found in the bibliography? Is every source in the bibliography referred to?

- Have the source books been used competently, carefully and critically?
- Does the author know how to distinguish facts, opinions and research results from the source material? Do they bring up these differences in their references?

#### **6. Scientific argumentation**

- Have the solutions and choices made been argued for and critically looked at?
- Can the researcher bring up their own justified opinions or ideas?
- Does the work have justified conclusions? How clear are the conclusions?
- Are there credible explanations to support the validity, innovativeness and necessity of the results?
- Can the researcher view their own work and research process critically?
- Does the work present constructive and concrete topics for further research?

#### **7. Progress and metatext**

- Does the text proceed coherently?
- Is the reader helped enough with metatext?

#### **8. Abstract, introduction, conclusion**

- Does the abstract describe what has been studied, what methods have been used and what kinds of results have been gained?
- Does the abstract encourage someone interested in the subject to read the thesis?
- Has the work been motivated in the introduction? Does the introduction present the research problem, research methods and information retrieval methods? Does the introduction present what kinds of results have been gained and who can benefit from them?
- Is the work summarised well in the conclusion?
- Is the conclusion critical, reflective and progressive?
- Does the contribution of the work become clear from the conclusion?

#### **9. Figures, tables, examples**

- Does the thesis include figures, tables and examples that help to understand the text? Are there needless figures or tables?
- Have the figures and tables been explained and referred to in the text?
- Are the figures, tables and examples the author's own? If they have been copied from sources, is there appropriate reasoning for that and have the sources been presented appropriately?

#### **10. Language and manner of representation**

- Is the language accurate scientific prose, which has nonetheless been written vividly and interestingly?
- Is the text clear and has no distracting language or writing mistakes?

- Has the presentation been formatted using the given requirements?

### **11. Contribution**

- Does the work have new, interesting insights?
- Does the work have new or clearer analysis?
- Have new methods been developed or have methods been used in a new way?
- Have new concepts or theories been developed clearly and have reasons been given?
- Does the construction developed in the work help to understand the problems of the subject matter better?
- Does the work create basis for developing new kinds of applications?
- Do the results of the work lead to applications and broader research and/or developing theories and methods?
- Do the work and its results have direct practical use?

### **12. Researcher**

- Does the text show that the researcher has examined the subject matter enough and that they are interested in and keen on researching the subject matter?
- Does the researcher show that they are able to view critically the subject matter and works of other researchers and themselves?
- Has the researcher shown capability and interest in paying attention to readers?