

Tvorba elektronických šablon pro UTB ve Zlíně

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ABSTRACT

The aim of this work is to create templates for electronic documents (theses) for Tomas Bata University and to improve them upon the student's requests which are collected during their finals. The theoretical part explains some aspects of the straight typesetting, typography and introduces the reader to a brand new work measurement system based on MOST – AdminMOST. The analysis presents the results of the survey targeted at the template users, the University students and it brings some interesting findings. Next, the author mentions several ways how to improve the templates and examines the AdminMOST system so the results may be compared. The project part brings an overview on what happened in the time run and how the project will continue.

Keywords: template, typography, Microsoft Word, OpenOffice.org, TeX, LaTeX, AdminMOST

ABSTRAKT

Cílem této práce je vytvořit sadu šablon pro psaní diplomových prací pro Univerzitu Tomáše Bati a jejich vylepšení na základě připomínek a požadavků studentů. Teoretická část práce vysvětluje různé aspekty hladké sazby, typografie a představuje čtenáři zcela nový systém měření práce odvozený z MOSTu – AdminMOST. Analytická část seznamuje s výsledky průzkumu, který byl určený pro uživatele šablony a přináší zajímavá zjištění. Dále pak autor zmiňuje několik způsobů jak je možné šablony vylepšit a pomocí AdminMOST systému srovnává rychlost, jakým je možné zformátovat šablonu. Projektová část přináší přehled událostí, ke kterým došlo a jak bude práce na šablonách pokračovat.

Klíčová slova: šablona, typografie, Microsoft Word, OpenOffice.org, TeX, LaTeX, AdminMOST

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Motto

“

Pouze život, který žijeme pro ostatní,
stojí za to.

”

“

Only a life lived for others is a life
worthwhile.

”

ALBERT EINSTEIN (* 1879– † 1955)

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INTRODUCTION

The role of the process engineer is quite simple to describe: his or her purpose of existence is to reduce waste in all areas of the work. Wasting time, human resources, space, etc. The aim of this work is not any different, yet it is going to be a little unusual. The author will try to describe, analyze and improve the process of writing the thesis by designing the electronic templates for the following desktop publishing software products: Microsoft Word, OpenOffice.org Writer and L^AT_EX. Further, the potential methods of productivity increase, in tasks related to the formatting of text, pictures and tables will be investigated. These possibilities will be considered: the system of automated citation using source of bibliographic data, automated system for removing the typographic mistakes via macros and macros for accelerating repetitious tasks. The author will evaluate the improvement in the writer's efficiency before and after the template and macros where effective. The typographic quality of the works produced is expected to rise as the document writers become aware of some of the conventions of the computer typography.

There may be a question emerging: "Is it meaningful to bother with the formal part of the paperwork and is the possible efficiency boost significant enough?" Many people working in the marketing area would agree on the statement for the presentation of the *packing sells the goods*. In my opinion we can apply this statement for the look of the paperwork as well. While purposeful content is of course the marginal thing when judging the paperwork quality, bad design can ruin even the best work. Think of the content as the information ware-house the author wants reader to share with and the look as the communication route. If the route is in a terrible condition, the information will travel much slower or might not reach its destination at all. Therefore it is important to improve the appearance of the documents created at the University.

At the beginning of the process-engineering project, the process to be improved has to be studied. This includes its inputs, outputs, behavior and the purpose for which it has been established. The process considered in this work could be entitled: "The writing of the thesis using a DTP program". The inputs consist of the information gathered by the writing person (cited publications, writer's knowledge, know-how, experience), the writer's ability to manage the software product used to write the thesis and the motivation. The output that the University requires is a nicely-formatted and content-full paper work representing both the writer's knowledge and skills. The tools (both hardware and software) conceived are a personal computer connected to the internet and the DTP software.

The major aim of the process engineering is to improve productivity. This could be done by reducing costs (inputs), increasing outcomes (outputs) or by the combinations of these two. If transformed to the matter of the subject discussed, we may be talking about the time the writing person spends on typing and formatting the work and the range and quality of the content.

During the time of writing my bachelor thesis I witnessed situations in which my student-colleagues were highly stressed because of the “ever-breaking” text/image layout after only a few changes were made to the document. I was asked to fix that many times . The reason why this was happening was almost always the same: the students were applying no system of structure in putting down the text in their works, no styles were used nor even automatic tables of contents was generated. This is, regrettably, still an actual problem. Especially at the time when the electronic form of the thesis will be required by the University, the formal look of the documents has to be accented.

I do hope that the results of my work will make the current situation better.

I. THEORY

1 TYPOGRAPHY

When talking about the form and layout of any paper document one cannot exclude the typography. Let me start with one of many definitions of this term. Typography may be defined as the craft of rightly disposing printed material in accordance with specific purpose; of so arranging the letters, distributing the space and controlling the type as to aid the maximum the reader's comprehension of the text. Typography is the efficient means to an essentially utilitarian and only accidentally aesthetic end, for the enjoyment of pattern is rarely the reader's chief aim. It follows that in the printing of books meant to be read there is little room for “bright” typography. The good type designer knows that, for a new fount to be successful, it has to be so good that only a few recognize its novelty. This is on the continuum of typography described as a purely technical and utilitarian act. Type is much more than this; it is the visual representation of language. Typography is part of everyone's environment and therefore should be considered as a greater contributor to our culture. [19]

Good typography helps the reader to distinguish among different things. Different letters are easy to tell apart, words are clearly separated from one another, the reader can easily move from one line to the next without getting lost or distracted, it's easy to see where paragraphs and sections begin and end, and so on. [23]

1.1 Basic Typographic Terminology and Units

Before we start to describe the concepts and thoughts of the present-day typography, we need to understand some terms and be able to interpret units. The definitions will not go into too much detail. More information can be found in the bibliographic resources listed at the end of this work.

1.1.1 Font, Typeface

Glyph

A glyph is an image, often associated with one or several characters. So the glyph used to draw “f” is associated with the character f, while the glyph for the “fi” ligature is associated with both f and i. In simple latin fonts the association is often one to one (there is exactly one glyph for each character), while in more complex fonts or scripts there may be several glyphs per character (In renaissance printing the letter “s” had two glyphs associated with it, one, the long-s, was used initially and medially, the other, the short-s, was used only at the end of words). And in the ligatures one glyph is associated with two or more

characters. [12]

Font, typeface

A font is a collection of glyphs used for the visual depiction of character data. A font is often associated with a set of parameters (for example, size, posture, weight, and serifness), which, when set to particular values, generate a collection of imagable glyphs. [11]

The terms typeface and font have become almost interchangeable, although “font” is used more often, “typeface” is more correct. In the olden days prior to digital type, a font was a subset of a typeface. For example, Helvetica is a typeface, whereas Helvetica Italic would be a font. A typeface or font can be thought of as a “letter design.” [13]

The two main font types developed in computer typography:

- outline fonts,
- bitmapped fonts.

Outline fonts

Outline fonts (sometimes referred to as vector fonts) are described as sets of beziér splines, with information about the width and shape of each spline. As the width and orientation is defined using mathematical formula the font can zoomed on computer screen or paper with no quality loss.

Bitmapped fonts

Bitmapped fonts or raster fonts in contradiction to the outline fonts are device dependent. That means that they are created for specific output resolution and may produce undesirable results if stretched or shrunk. The information about the position of each pixel is stored within the font file as the dot-matrix. The difference between outline and bitmapped font is illustrated in Figure 1.

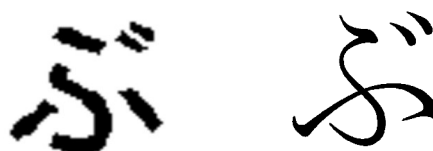


Figure 1. Bitmapped vs outline font¹

¹ STŘÍŽ, Pavel, ŘÍHA, Jozef. TeX-Collection 2003 a 2004. In *Informační Bulletin České Statistické Společnosti*. [s.l.] : [s.n.], 2004. s. 4-7. Available at: <<http://www.statapol.cz/bulletiny/ib-04-4.pdf>>.

1.1.2 Font Sizes, Spacing

Font size

When the font is used in document, we need to know and understand what and how is the size of the font defined. The look of the glyph is specified using these four baselines:

1. baseline

It is the line on which all the letters in row sit.

2. ascender line

Ascender line is the line that is on the highest point of h and other tall lowercase letters. Ascender also is part of a letter that is above the mean line. [6]

3. mean (waist or head) line

The mean line is the guideline showing the correct position for the upper boundary of the x-height. [20]

4. descender line

The font size is the length between the highest and lowest baseline usually measured in points.

The other lines are: cap line which refers to the height of the capital letters and slant line which gives guidance for how the letters should be slanted (e. g. for italics). The main 4 baselines are illustrated in Figure 2.



Figure 2. Baselines

Source: <http://www.st-andrews.ac.uk>

Kerning

Kerning, or pair kerning refers to an adjustment of how tightly or loosely letter pairs are typeset. Without kerning adjustments, some pairs of letters would appear to have too much space between them. Proper kerning makes type easier to read by eliminating distracting whitespace in between letters. Most contemporary fonts have kerning adjustments built in [6]. Example of extremely improper kerning: This is an example of improper kerning.

Leading

The distance between two (of a kind) baselines is called *leading*. The name originally referred to the process of increasing the space between lines of metal type, by putting thin strips of lead in between the lines [1]. The exact leading value is often determined by the line length. Longer lines require greater leading to allow the eye to find the next line as it moves back and down. Leading is usually expressed in Points. A simple rule is to add 2 to the type point size to determine the leading value. A type size of 12pt typically requires a leading value of at least 14pt [24].

1.1.3 Typographic Units

In Europe, the Didot point system was created by FRANÇOIS-AMBROISE DIDOT (1730–1804) in c. 1783. Didot's system was based on PIERRE SIMON FOURNIER's (1712–1768), but Didot modified Fournier's by adjusting the base unit precisely to a French Royal inch (*pouce*), as Fournier's unit had not conformed precisely to any standard unit.

Here is the list of some most commonly used units in present time:

- 1 point (Didot) = 0.376 mm = 1/72 of a French royal inch (27.07 mm)
- 1 point (TeX) = 0.3514598035 mm = 1/72.27 inch
- 1 point (Postscript) = 0.3527777778 mm = 1/72 inch
- 1 pica (TeX) = 4.217517642 mm = 12 points (TeX)
- 1 pica (Postscript) = 4.233333333 mm = 12 points (Postscript)
- 1 cicero = 4.531 mm = 12 points (Didot)

The printing and publishing software market is at present dominated by manufacturers (Apple, Adobe, Microsoft, Quark, etc.) located in the United States, the last country on the planet that has yet to make significant progress towards the introduction of modern standard units. As a result, the use of standard units is far from well established in digital typography, to the significant annoyance of users all over the world.

The main problems are:

- The dominant unit of length, the Postscript point, has with $25.4/72 = 0.352777\dots$ mm a very inconvenient relationship to the most widely used length units (meter and millimeter).

- There exists no well-established practice for denoting a font size. One example of a somewhat established convention is to specify the length of an “em” in PostScript points. Historically, the “em” was the width of the widest metal type in a font, which was for Roman fonts typically the capital letter “M”. Today, the control points of digital font outlines are stored in terms of coordinates inside a unit square. This square is a vague equivalent of the historic maximum metal type size and its side length has become the modern incarnation of the “em”. As a result, no easily measurable dimension in a text matches the point length that designates a font size.
- Resolutions of output devices are still frequently specified in dpi (dots per inch), which is the reciprocal value of the pixel size multiplied with 25.4 mm.

With the metric system, we have now a well established, consistent, and globally accepted set of length units, ranging from subatomic to cosmological dimensions. The use of archaic ad-hoc special purpose units has become obsolete and should be strongly discouraged.

It is time that the typographic community finally abandons its current unit mess in two ways:

- adopt the metric system
- denote font sizes based on a measurable characteristic length of the printed glyphs

Metric typographic units are already used in Japan and to some degree in Germany and other European countries. However, the market dominance of US-originated typographic software without proper support for metric units at all levels currently hinders the further deployment of metric typographic practice.

The German draft standard DIN 16507-2 suggests that all length measurements in digital typography should be specified in millimeters. It suggests further that dimensions should be multiples of 0.25 mm, or where a finer resolution is required multiples of 0.1 or 0.05 mm. [15]

There are two special units that are used besides the Didot's system that are based on the actual font size used. Those are:

- em

Em is a traditional unit of typographical measurement. In handset type, it is a metal space that is the square of the type body size; that is, a 10-point em-quad is 10 points wide. The em gets its name from the fact that in early fonts the M was usually cast on a square body. [5]

It must be remembered that any measurement given in ems is not by itself a fixed size, but is meaningful only in relation to the size of type in use; “one em indent” in 8-pt type is 8 points, but in 10-pt is 10 points. In most type families the em space is designed as a square of the point size. Therefore, units are relative, the larger the point size being used, the larger each of the units will be, but the number of units will not change. [14]

- ex-height

X-height is based on the size of a letter. As the name implies, it refers to the height of the letter x, and it serves as sort of a general reference to the height of the lowercase letters within the font. X-height is used to make decisions about leading. Since every font has a different x-height, there's no such thing as a generic leading specification. You need to make leading decisions based on the size and usage of your font. [7]

1.2 The Basic Rules of Straight Typesetting

The straight typesetting is a typesetting of paragraphs of defined width using specified font and size. The rules applying for this type and valid for the Czech environment were defined in the Czech standard ON 88 2503 – Základní pravidla sazby (The basic rules of composition) from 1975. Though often cited, the standard is invalid since 1994. In 1997 the new standard has been carried into operation: ČSN 01 6910 – Úprava písemností psaných strojem nebo zpracovaných textovými editory (The arrangement of documents written on the typewriter or processed through text editors).

The following preview of rules is based on the latter standard and is valid for the documents written in Czech language.

1.2.1 Space

The horizontal space separates words or characters. The common width of space between words is $\frac{1}{3}$ em. The width however may be stretched or shrunk as a result of paragraph justification. The acceptable width ranges between $\frac{1}{4}$ and $\frac{1}{2}$ em. The space of static $\frac{1}{4}$ em width is used in special cases (when optical balance has to be achieved) – after full-stop, comma, apostrophe, double quotes and few others. This space is unbreakable, that means the line cannot end with such character.

In Czech typography, the non-breaking space is used in the following cases:

- after one-letter conjunction or preposition: “k, o, s, u, v, z, a, i”, the width of this space is flexible,

- between initial and the last name (E. Mikulcikova), number and unit name (5 m, 10 %), triple figures (839 392 092) – in such cases, non-flexible space is used.

In certain cases (e. g. to separate mathematical formulas from comments) a space of one-em or two-em width is used.

The space comes after a word, abbreviation, mark, number or delimiter. There are however certain exceptions, where the space is not used:

- after a full-stop – in section numbering (2.1.4) or in financial figures (EUR 13.000);
- after a comma – in decimal numbers (11,5 mm);
- after a colon – to designate the time (10:30 am);
- before and after a hyphen (1977-04-14; long-term);
- before and after a slash (60 m/h);
- if the delimiter is followed by another delimited (this was his „world“);
- after “+” and “–” signs when standing as a unary operators (+15 °F);
- after a superscript (mm³, 15²);
- after a suffix (H₂O);
- if there is not enough space in a box to fill.

1.2.2 Dash

Many people recognize “-” sign as the dash. Apart from the fact, that it is not a dash at all, there are two types of dashes + minus sign known in the typography. A *divis* (hyphen) “-” is used as a joining character in compound expressions (Czecho-Slovakia). It is also used to hyphenate words at the line break. The dilemma of line breaking is discussed in the following chapter.

En-dash “–”:

- distinguishes the parts of the sentence. Then the ¼ wide space is used before and after this sign.
- has the meaning of “to, from – to, versus”. It is set commonly without spaces before or behind it.
- is ½ em wide (width of letter “n”).

Em-dash “—” is used for the purposes of parenthetical punctuation, it does not occur in Czech typography.

Minus sign (“−”) has the dimension and position inherited from the “+” sign. When it serves as a binary operator (5 minus 3), we put space between the sign and the operators, if it stands as the unary operator (−5), the number immediately follows.

Table 15 clarifies the different usage of each of the signs.

The element title	Sign	Example
hyphen	-	mathematico-logical
en-dash	–	18–21; good – evil
em-dash	—	text — author’s comment — text
minus	−	12 − 5 = 7; −10

Table 1. Distinction between dashes and other signs

1.2.3 Parentheses

In straight composition parentheses “()” or brackets “[]” usually occur. The braces “{ }” are rarely used. If the whole sentence is bounded by the parentheses, then with all the punctuation marks. (As is this sentence.)

1.2.4 Ellipsis

Omission marks are universally represented by three consecutive periods (also known as an ellipsis). Their spacing, however, depends on house style and typographic conventions, and significant difference are observed. [2]

The marks of omission are used to signify that words have been omitted from a piece of text that you are quoting (e. g. “The great masses of the people ... will more easily fall victim to a great lie than to a small one.”). Without these omission marks, a quotation might be open to misinterpretation. For example, the shortened version might have missed out an important subsidiary clause, that modifies the statement. To take an extreme example, if the statement, “I agree that you should go ahead with the house purchase, subject to a satisfactory survey, and wish you all the best.”, was shortened without omission marks, it would read: “I agree that you should go ahead with the house purchase and wish you all the best.” In this case, the marks would not help a great deal, but they should alert the reader to the fact that something has been left out of the quotation. [22]

1.2.5 Ligatures

Properly spacing fonts brings with it all sorts of issues. For example, to properly typeset the letters “fi”, the i should be very close to the f. The problem is that this causes the dot on the i to collide with the f, and the serif on the head of the i to collide with the horizontal stroke of the f. To deal with this problem, font collections include ligatures. For example, the “fi” ligature character is a single character that one can substitute for the two character string “fi”. Most fonts contain fi and fl ligatures.

1.2.6 Small Caps Fonts

Small caps fonts are fonts that have reduced size upper case letters in place of the lower case letters. These are useful for writing headings that require emphasis (and they are often used in L^AT_EX). Typically, when one writes a heading in small caps, they use a large cap for the beginning of each word, and small capitals for the rest of the word (“title case”). The advantage of this over using all caps is that you get something that is much more readable (using all caps is a big typographic sin). [10]

1.3 Factors That Effect The Readability of Type

In [18] these factors have been identified to effect the reading of type:

1. The style of the typeface. Familiar styles are usually the most readable.
2. The size of the typeface. Within reason, the larger the face, the better.
3. The length of the line. Comfortably narrow columns are better than wide columns. A line of more than 60 characters is hard to read.
4. The amount of leading between lines. Most body sizes can use at least one and probably two.
5. The pattern of the column of type. It should be even-toned.
6. The contrast between the darkness of the type and the lightness of the paper. The more contrast the better.
7. The texture of paper. It shouldn't be intrusive.
8. The relationship of the type to other elements on the page. The relationship should be obvious.
9. The suitability of type to content. The art director should exploit the "personality" of types.

TypeFactors that effect the experience of reading:

1. On display typography, group type as it reads. Give consideration to line breaks in the same way.
2. It is always safe to stay within a family of type rather than mixing typefaces in a single production. This is the conservative (classic) approach.
3. You can mix and match but rarely more than 2 faces in a single publication.
4. Always tighten letterspacing on display (headline) type.
5. Do not use a lot of different type sizes, but make sure those used are clearly distinguishable.
6. Set sans serif typefaces in slightly shorter line lengths than serif typefaces for maximum readability. Use a shorter line length for typefaces that have a strong contrast in thick and thin strokes. These faces can be difficult to read in extended settings because a "picket fence" look is created that tires the eye.
7. Text type is best set in the range of 9 to 12 point; 14 point for children's books.
8. Typefaces set in the same size may look larger or smaller depending on their x-heights.
9. Type that is set flush left, ragged right often has more even spacing throughout. Because the type is aligned on the left, and because each line at the right is either longer or shorter than the next, readers can easily locate the beginning of a new line.
10. Take care not to rag the type too much when you set ragged right text. The extreme ragged edge creates uncomfortable rhythm and calls attention to the shape of the column. A "soft" ragged right should look like a piece of paper loosely torn from top to bottom.
11. When you justify a column of type, make sure the additional spaces between letters and words don't create awkward gaps or "rivers." This can be disruptive to comfortable reading, but is difficult to avoid when the column width is narrow.

1.4 Problems of Modern Typography

The problems of the current computer typography appear in these contexts:

- social context

Many people are not aware of even the very basic typographic conventions, such as those listed in standard ČSN 01 6910. They are for example omitting the spaces after the full-

stop at the end of the sentences, use incorrect punctuation marks (inch instead of double quotation mark) or use uncommon and unaesthetic formatting (underlined letters).

In many cases, the writers are not familiar enough with the capabilities of the DTP software they use, not knowing many things may be automated. Multiple empty paragraphs, used in many situations, instead of page break lead to the repetitious actions of adding/removing these lines every time the text is inserted before them. This is the same case with the multiple spaces used instead of one tabulator and few others.

- technical context

Not every DTP software is able to handle various requirements of the typography. Some of them manage them with ease, in others the proper looking composition may be a nightmare. Such an example may be a floating object (figure, table), that is placed automatically at the place with enough empty space, so the composition is as consistent as possible, advanced techniques for breaking the text lines (as described in the next section) or system for avoiding orphans and widows.

1.5 Linebreaking – Not So Easy As It May Appear To Be

Line breaks in text are a very hard thing to get right. People are pretty good at detecting bad ones; so publishers must respect that ability and provide good breaks, but they can also exploit the ability and simply use people to get them right...up to a point.

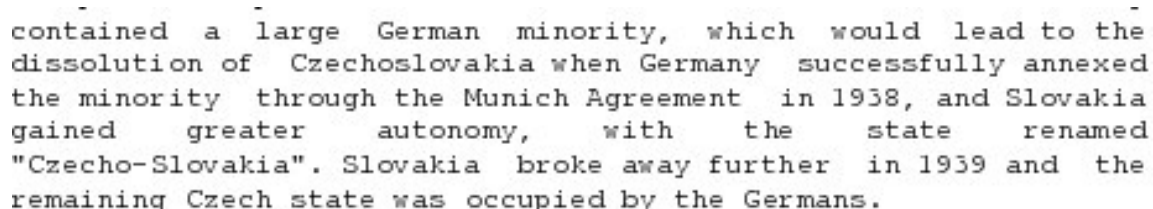
The problem is that bad line breaks pop up quite easily, and it's very, very tedious work to find and fix them all by hand over and over. [17]

The problem of finding the best spots in the text for line breaks is ever-lasting, even with the arrival of modern and advanced DTP systems with advanced algorithms there does not exist a satisfactory solution to perform this action.

Text editing software Text-602 (T-602) by Software602 software was the 1st widely used text editor in our lands. For many people this was the first DTP-like software they've encountered. In fact, it lacked too many functions to call it even DTP look-alike. Personally, I'd call it an editor of plain text (which it really was) with some extra functions. However the users of this product started to think that this was what all the computer text editing and printing is all about. With the mass arrival of Microsoft Office suite and its MS Word everybody was excited about the new functions like colors, proportional fonts, images etc. but people were over-taking their bad habits from using T-602. One of the things is the absolutely wrong premise that it is right to have any number of spaces

between two words in one line in order to have the text justified. Many didn't realize that while the justification itself was a must, we didn't have to sacrifice everything. I've never had a feeling that hyphenation was extraordinary emphasized by the tutors teaching us T-602 basics. Please consider the visual example of how the text-flow looks like with and without use of hyphenation. Figure 3 shows how T-602 would justify text without using hyphenation. Note space between "gained" and "greater" – it is too wide forcing the eye to bounce. This causes the reader's inner voice to slow down, possibly resulting in the attention loss. Moreover the paragraph containing many empty spaces gives no aesthetical feeling. The typography is talking about the paragraph shade balance which is the level of how well the letters and spaces are placed within the paragraph. Wider spaces create brighter areas and vice versa. I used function Pixelize 15 pixels to visualize the grayness of the considered paragraph (see Figure 4). At the place where the mentioned line takes place one can quite easily recognize white and light-gray pixels that break the the color uniformity.

As the T-602 does not know how to handle proportional fonts and it cannot create spaces floating point wide there is not other way than to use hyphenation in order to eliminate the unwanted white hollows. The way how T-602 would break the paragraph lines using hyphenation is shown in Figure 6. As you can observe the unwanted spaces were fairly eliminated. In case we use MS Word or OOo Writer to the hyphenation, it would also break "Czecho-Slovakia" into halves, T-602 was not able to perform this action. The ability to correctly hyphenate depends on the quality and quantity of hyphenation patterns. The major issue with the T-602 editor was that it was not able to do the hyphenation "on-the-fly" so the user had to use reformat paragraph function. People usually either had not discovered this function or were not too eager to use it. Once they switched to MS Word, even with on-the-fly hyphenating function, they never had the feeling to turn it on. And this function is overlooked in the more modern DTP systems as well.



contained a large German minority, which would lead to the
dissolution of Czechoslovakia when Germany successfully annexed
the minority through the Munich Agreement in 1938, and Slovakia
gained greater autonomy, with the state renamed
"Czecho-Slovakia". Slovakia broke away further in 1939 and the
remaining Czech state was occupied by the Germans.

Figure 3. The justified paragraph without using hyphenation

As a matter of fact, there are several techniques how to reduce hollows in composition. They are listed:

- hyphenation,
- deformed fonts (horizontal micro-typography),
- letterspacing,
- reformulation of the writer's idea so the structure changes.

1.6 Hyphenation

Let me describe each of them.

User usually has the option to hyphenate any word at any place at will, too. This is called *discretionary hyphen*. Certain rules are to be followed when talking about justified paragraphs:

- The basic space between two words is $\frac{1}{3}$ em wide, it is stretched or shrunk appropriately to achieve a “good looking” justification,
- all spaces between words in one line have to be the same width,
- the narrowest space should not be smaller than $\frac{1}{4}$ em and must not be smaller than $\frac{1}{6}$ em (width of letter “l”),
- the widest space should not be wider than $\frac{1}{2}$ em (width of letter “n”).

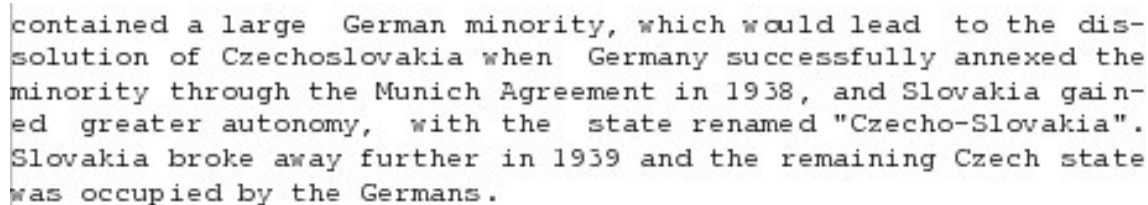


Figure 4. Tone representation of the paragraph in Figure 3



Figure 5. Tone representation of the paragraph

More evident difference can be seen in a narrower typesetting. In a paragraph of text, a series of wordspaces that accidentally align vertically or diagonally, creating an unwanted flow of white space within the column of text are referred to as rivers (Fig. 7)



contained a large German minority, which would lead to the dissolution of Czechoslovakia when Germany successfully annexed the minority through the Munich Agreement in 1938, and Slovakia gained greater autonomy, with the state renamed "Czecho-Slovakia". Slovakia broke away further in 1939 and the remaining Czech state was occupied by the Germans.

Figure 6. T-602 – hyphenated paragraph

There is not currently known algorithm that would be able to manage all linebreaks automatically and in the best manner that would work for all kind of type. Three basic line breaking algorithms exist:

- first fit (which essentially packs the text as tightly as possible one line at a time),
- best fit (which can loosen it up if this works better, but still works line by line),
- optimum fit (optimal in the sense that it minimizes the sum of the “demerits” earned by the various distortions of each line, taken over the paragraph as a whole).

1.7 Microtypography

A number of techniques for finetuning the appearance of text are described under the heading of *microtypography*. Only few DTP programs observe these rules which evolved from the centuries of dealing with type from the time of GUTENBERG to the computer age. [16]

Let us take a look at Gutenberg’s famous 42-line Bible, printed about 1455. What makes this Bible the unattainable masterpiece of the art of printing? Its printing on a wooden handpress? Not really, because by today’s standards the presswork is not of extraordinary quality and sharpness. We can still obtain handmade rag paper today. Maybe the secret of his beautiful pages is in the proportions of the columns on the sheet. But this we are able to repeat. Therefore only the composition is to be considered.

How could Gutenberg get those even gray areas in his two columns without disturbingly wide holes between the words? His secret: the master achieved this perfection by using several characters with different widths, combined with ligatures and abbreviations, in his lines. He finally needed 290 characters for the composition of the 42-line Bible.

HERMAN ZAPF inspired by this great work created *hz-program*. It is partly based on a typographically acceptable expansion or condensing of letters, called scaling. Connected with this is a kerning program which calculates kerning values at 100 pairs per second. The kerning is not limited only to negative changes of space between two critical characters, but also allows in some cases positive kerning, which means the addition of space. [25]

1.8 Letterspacing

Letterspacing refers to the amount of space between letters in a word. FREDERICK GOUDY, the famous typographer (1869–1947) once said that “men who would letterspace lower case would shag sheep”, as that was (and is) considered a cardinal sin by typographers. Letterspacing caps, however, is done and should be done generously.

The very last technique how to rectify a bad looking paragraph is to change its contents – by using an abbreviation, replacing a word by its synonym, remove the unnecessary expressions or similar.

Professional DTP systems (non-commercial L^AT_EX that will be mentioned in this work or commercial systems like Quark, InDesign) use various techniques and advanced algorithms (such as hz optimization) combination to achieve the best looking typesetting. However user intervention (best the typographer's) is often necessary and required.

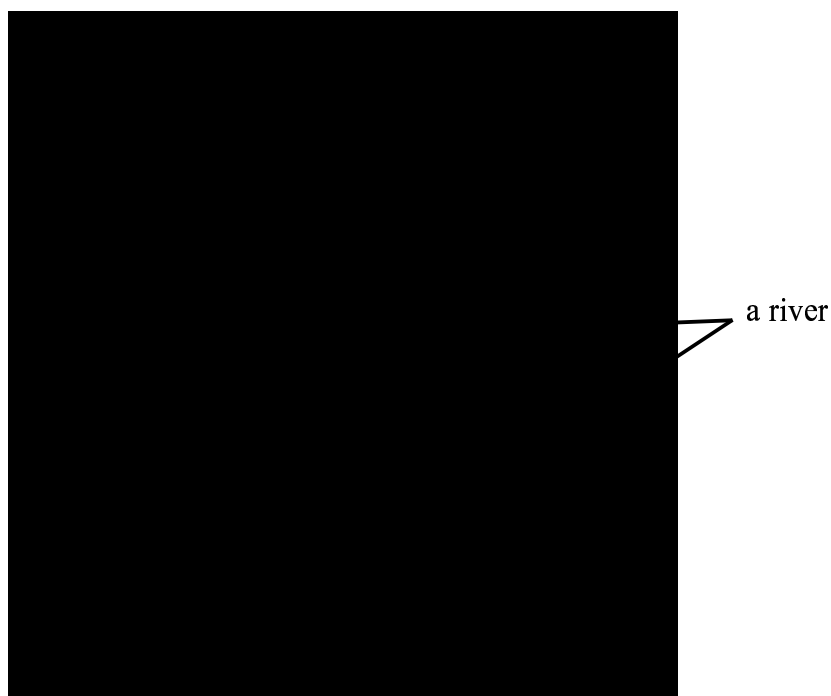


Figure 7. Rivers

There are of course many more problems, the current computer typography still has to fight with. Those are for example: hyphenation, float placement, page breaking, placing of headers and footers, placing of footnotes. It is a proof that the computer typography cannot cope every problem and the hand of professional is a must.

2 WORK MEASUREMENT

According to the fact that the part of the analysis would be dedicated to the measuring and evaluating the efficiency benefits of creating and using the template, this chapter will provide some useful information about the methods of work measurement.

Work measurement involves measuring the time content of work and determines the *Standard Time* for a task (this is defined and explained below). The concept was developed by F. W. TAYLOR in America in the 1880s. The need is explained below.

Work measurement is based on a six-stage methodology:

- *Select* the task to be studied.
- *Record* the elements making up the task.
- *Measure* the times for elements.
- *Analyze* occasionally occurring elements.
- *Define* the standard method and standard time
- *Install* the method and train the operator to use the time.

An element of work is a small part (usually less than 1 minute) of a task. In all techniques of work measurement analysis is at an elemental level. This enables the work method to be identified. Differences in task time may occur because different elements of work are included in successive repetitions of the task. A single measure of the time for the task as a whole would prevent the identification of this assignable cause of variation. Measurement at an elemental level enables occasionally occurring elements to be identified and to be quantified in terms of both duration and frequency of occurrence.

For machine work the standard time can be calculated knowing the speed of the machine and the task required. This calculation is for the machine time only, and is called the basic time. Allowances are added, as described below, for occasional elements of work, delay and for rest pauses between tasks. The time thus calculated is the standard time. For a totally automated system the standard time is the basic time, but most machine work also involves people. A standard time therefore may include both machine and human elements of time.

For manual work done by people, work can be measured observationally or predictively. Since people can choose their own speed or rate of work the actual time to do a task will be a variable, varying inversely with the speed of work. In order to obtain a basic time, a

Standard Rate of working must be defined. A standard time for a task is then defined as the time required for a qualified and motivated worker to perform a specified task using a specified method if the worker works at a standard rate of work and takes the appropriate rest period. A standard time includes allowances for occasional elements of work, delay and for rest pauses between tasks.

2.1 WORK MEASUREMENT TECHNIQUES

There are several different techniques of work measurement. The choice between them depends on the cycle time and frequency of use of the task since these determine the cost and benefit of the technique. Figure 8 shows the range of work measurement techniques available. [21]

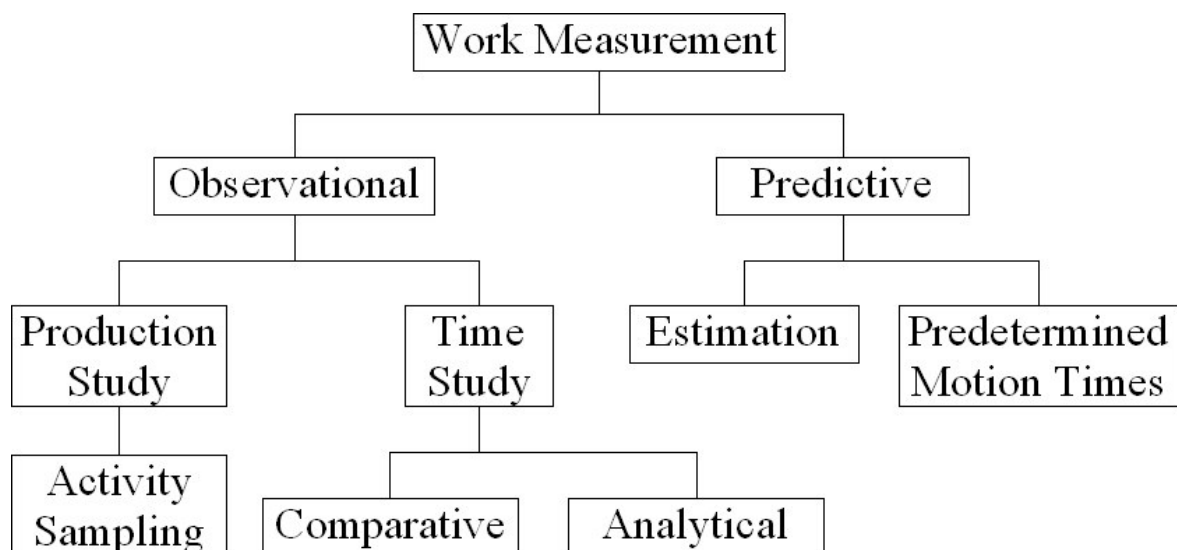


Figure 8. Work measurement techniques [21]

2.1.1 Observational Techniques

Observational techniques of work measurement require an operator to perform a task in order that it can be measured using a stopwatch. Time Study examines the time for a task, a Production study examines a whole set of tasks in a period of time in order to determine how time is spent. [21]

2.1.2 Time Study

Measurement is at an elemental level as described above. The technique is historic, in the sense that the work has to be done by someone in order for it to be measured. Because the

task is being done, the operator can choose to work fast or slow. This will affect the time observed. What is needed is a time that is independent of the operator's speed of work. Since the speed or rate of work may not be standard, an assessment of work rate is made which is used to adjust the observed time to the basic time (the time it would have been if the operator had been working at the standard rate). This approach, which is explained below, eliminates the variation of task time due to the variation in work rate and derives a time for the standard rate of work. [21]

Basic time (for element) = Observed time x Observed rating / 100

$$\text{Basic time (for task)} = \frac{\sum \text{Observed time} \times \text{Observed rating}}{100} \quad (1)$$

$$\text{Basic time (for task)} = \sum \text{Basic times (for elements)} \quad (2)$$

A task must be observed many times in order to identify the appropriate method and to obtain accurate results, given the random variation inherent in this measurement. The basic time is based on the average of many observations and calculations.

These techniques can only be used whilst a task is being done and can cause a lot of industrial conflict since operators may seek to obtain a larger time than actually required. The technique can therefore only be applied historically to work already being done. Time Study is time consuming and would only be used for repetitive manual tasks. [21]

Occasional elements of work

For repetitive work most elements occur every time the task is done. Some elements however occur occasionally. For example, adjusting a machine or tool, or measuring the size of a component. In this case the time for an element is measured and also its frequency of occurrence, for example x % of task occurrences. x % of the element time is then added to the basic time for the task to 'credit' this occasional element. For example, for an occasional element of 1 minute duration that occurs once every 5 occurrences of a repetitive task, 1/5 or 0.20 minutes (12 seconds) is added to the basic time for the task. (small times are kept as centi-minutes, 2 decimal places of minutes, not as seconds). [21]

Assessment of rate of work

Observational techniques of work measurement require an observer to 'rate' the observed work. This process establishes the operator's rate of working relative to the Standard Rate of work. This is done subjectively but the result is expressed numerically using a rating

scale. BS3138 defines the rating scale in use in Britain. The Standard Rate is arbitrarily defined as 100. Slower rates of work would be assessed using numbers less than 100 and work faster than standard would use numbers greater than 100. Rating is not a scientific process but a subjective assessment of the speed and effort of work relative to what is thought to be the standard rate of work. Observers need training to achieve reasonable accuracy and consistency. Table 2 shows the British Standard rating scale. For the standard task of walking the rating scale can be related to walking speed (measured in miles per hour). This correlation is shown in the table. Rating can have any value; the table shows and defines the rate of work for only five points on the scale. In practical terms, the scale could be said to range from 50 to 150 since work rate outside this range would be difficult to achieve and even more difficult to measure with any accuracy. [21]

Table 2. British Standard Rating Scale [21]

<i>Rate</i>	<i>Description of work effort</i>	<i>walking speed</i>
150	Excessive effort, increased heart rate	6
125	Fast, dexterous and skillful	5
100	Brisk, businesslike, motivated	4
75	Slow, unhurried, unmotivated	3
50	Clumsy, fumbling, very slow	2

2.1.3 Production Study

In a production study a stopwatch is used, as in timestudy, but what is measured is different. Instead of looking at a single task, a work situation is observed over a period of time. This may involve one or more operators and/or one or more machines. The objective is to determine how time and resources are used. The result will usually be in the form of a multiple Activity chart (see figure 54.4) and should include measures of resource utilization (see equation 5C.3 in unit 5C).

The period of time must be long enough to be typical or representative if the results are to be meaningful. Activities are observed and their duration and frequency of occurrence noted. To simplify the process activities may be categorized into a small number of categories that are relevant to the purpose of the study. An example is given in Table 55.2 below. Note that inactivity is included.

1 Operating machine	4 Adjusting machine	7 Communicating
2 Loading/Unloading machine	5 Changing a tool	8 Moving components
3 Measuring a component	6 Setting up machine	9 Doing nothing

Table 3. An example of activity categories

Note that only activity 1 is value-adding productive work. The operating capacity of the machine depends on how much of the working day is spent operating. If output is less than expected, it may be because the utilization of the machine is low. This does not mean that the operator is doing nothing, but that ancillary tasks are being done. With this type of study it is possible to identify and quantify problems that may be reducing machine capacity. These should lead to the solving of the problem and the improvement of productivity. A production study is time-consuming so is not used often. It might be used when a problem has been identified, further analysis of it is required and its cost can be justified.

2.2 MOST

It was discovered by FRANK AND LILLIAN GILBRETH that all manual operations were combinations of basic elements. The Gilbreths isolated and identified these elements primarily so that methods could be accurately explained and improved. They reasoned that to reduce the motion content of a task was to reduce the effort and the time to perform the task. The result is higher production and an increased service level. [4]

The analysis of work today, as practiced by industrial engineers using a predetermined motion time system, is performed by systematically breaking work down into very small and distinct units called basic motions. [4]

The first predetermined motion time system placed in the public domain, Methods Time Measurement (MTM), was developed in 1948 by HAROLD B. MAYNARD, G. J. STEGEMERTEN and J. L. SCHWAB. MTM has been recognized as a very accurate predetermined motion time system and it is also widely accepted. Based on a new concept conceived in 1967, BasicMOST for general industrial applications was developed and introduced in 1972 in Sweden and in 1974 in the United States. [4]

2.2.1 AdminMOST

ClericalMOST was designed for the clerical activities in office and service environments. ClericalMOST has been updated to reflect current administrative tasks and is now called,

AdminMOST.

AdminMOST is a variation of the BasicMOST Work Measurement System. It is based on three activity sequence models. They are General Move, Controlled Move and Tool and Equipment Use. As the process of thesis writing takes place explicitly at the computer desk, I will only present the Tool and Equipment Use sequence models that are sufficient to describe the tasks involved. In the next subsections parameter definitions characteristic for these models will be described. [4]

2.2.2 Think (T)

Think refers to the use of sensory mental processes, particularly those involving visual perception, and may also include “reaching to feel an object.”. The Think datacard in Table 4 is designed to cover only those types of reading and inspection activities that occur as a necessary part of a worker's job. Although these operation usually occur internally to the manual work and therefore have no effect on the duration of the work cycle, on some occasions these activities must be considered in the overall work content of the job. The analyst should exercise care in determining the extent to which these activities affect the total analysis time. Placement of reading material to hold in an approximate location will always be a P₀, unless the exact location is required. The P parameter will always follow the definitions presented in the General Move section. [4]

Table 4. AdminMOST datacard – Think (shortened) [4]

<i>T – THINK</i>				<i>Index</i> × <i>10</i>
Inspect	Read			
Eyes/Fingers	Eyes			
Points	Digits, Single Words	Text of Words	Compare	
1	1	3	1	1
3	3	8	2	3
	Gauge			
5	6	15	4	6
	Scale Value Date or Time			
9	12	24	8	10

Inspect

The data in this column applies to inspection work designed for making simple decisions regarding certain characteristics of the object under inspection. The activity involves first locating the inspection points and then making a quick yes-or-no decision concerning the existence of a defect.

Read

To read is to locate and interpret characters or groups of characters. The data for Read is divided into three sections: Read Digits or Single words, Text of Words or Compare.

The column Digits or Single Words is to be used for reading data such as item numbers, codes, quantities or dimension form a blueprint. A digit is considered a letter, a number or a special character. To index the T parameter, simply count the number of digits or single words read and choose the appropriate index value from the data card.

The column Text of Words is used when analyzing situations in which the operator is required to read words arranged in sentences or paragraphs. The data is based on an average reading rate of 330 words per minute or 5.05 TMU per word. These index values may be applied to reading a set of instruction in a manual or job aid or gathering general information from reading tabular data.

The values for Read also include time to Compare numbers. This refer to the ability of a person to momentarily retain a character and to examine its similarities or differences to other numbers or to a series of numbers. The data allows a person to scan several characters, review them and either accept or reject the comparison. The index value is chosen by the number of letters or digits compared.

2.2.3 Keyboard/Electric Typewriter (W)

Refers to the use of the fingers and the hands of type words, sentences, letters, headings, etc. The data in this category refers to the use of the fingers and hands performing moves to type words, sentences, letters, heading, etc. The data for the W parameter should always be considered within reach and the hand placement is P₁. [4]

The Words section of the Equipment Use Sequence Model defines words as an average of 5.5 characters per word plus time for spacing and any punctuation or capitalization needed. The values for Words are shown in Table 5. In addition to typing Words, there is an additional element of clicking the mouse. [4]

Table 5. Index values for Words (AdminMOST datacard)

<i>Index × 10</i>	<i>W Keyboard</i>
	Words
1	Click mouse
3	1
6	2 Date
10	4
16	6

Click Mouse (W_1)

The value to Click a computer Mouse includes the time to move the mouse ≤ 4 inches (10 cm), align the cursor to one point and click the mouse once or twice. When clicking the mouse twice, the action is quick and short. This is often used when opening a software application. The placement value of the hand to the mouse is P_1 . The Process Time, which often follows the click of the mouse, is not included in the W_1 value. [4]

3 PRODUCTIVITY

There are many ways how to improve the productivity of a person busy writing a thesis. Worker performance in general depends on:

- motivation
- ability
- work environment.

Motivation

Motivation is the set of forces that compel behavior. The student is motivated by the possibility of gaining a degree after the successful discussion of his/her work. We may be able to apply some methods from psychology to persuade the user that to start writing the thesis in advance is a good thing, certainly better than ever putting it off until the very few weeks before the deadline. There actually is a contest for the best thesis at the University being held each year. The lucky students are awarded, get a valuable present and receive an applause from the audience during a graduation. However I don't see this event/contest as a crucial motivation factor. Many times it effects contraproductively. Other students like to point at the awarded one with finger and start to call them nerd or such. Czech mentality may pretty much described by the attitude of its national hero – Svejek. One of his most quoted motto was “Easy”. Who would want to be uneasy taking care of his/her career, ever trying to be the best and achieve the great results then?

The climate is, of course, changing. Many students have and take the opportunity of apprenticeship abroad via AIESEC or IAESTE organization. That gives them rather different view, making them more responsible in the ideal case.

I therefore suggest to promote the activities of both mentioned student organization in more viable way. The students returned from these apprenticeships with the gained experience and attitude have better conditions to write a successful thesis. Moreover they might consider writing the thesis in foreign language, allowing the potential foreign employer to add a few more good points to the job application.

Next thing is that many thesis are the dead-end roads – once the student is done with it, he/she usually starts another project, leaving the results of their work to rot. The world trend in modern countries is the process of educating its own employees in order to give them the knowledge and skills they need, reducing the rehiring costs and raising the employees morale. There are certain companies that co-operate with the University but I do

not think the number is enough. The motive of writing the paper which results would be a real benefit for a concrete people is significant. A good cooperation between the organization and the student is likely to be formed, the chance of turning into a regular employee are increased. As the students are many times good at finding the company in which they would work the engagement of the University would give such cooperations a better credit.

Ability

The abilities required to write a good thesis are:

- the theoretical knowledge gained during the time of study,
- the level of written expression, ability to use and cite the technical literature,
- practical skills, ability to handle the word processor, spreadsheet and presentation software, etc.

The level of theoretical knowledge varies from a person to person, depending on their priorities and perception abilities. The students are forced to study during the semester, written expression is trained by writing the semester works.

What is lacking is a standard and set of rules every student should follow while writing. The era of typewriting machines is long-gone and to my surprise I can still see the majority of students that justify the text using the space characters, format and enumerate each heading by hand, fix the figures that broke apart at the page break after the new paragraph had been added, slashes instead of parenthesis and so on. Therefore I think the area of correct computer typesetting should be more stressed on during the study.

Work environment

The social, technical, ergonomic factors that influence the students performance are called work environment. While the social interactions are the subject of work psychology studies, the process engineer strategies may apply in the technical and ergonomic areas. Ergonomics will be briefly mentioned in this work, giving some suggestions for a future work.

II. ANALYSIS

4 SURVEY

4.1 The Aim

For the purpose of mapping the actual situation in the area of writing the thesis, writers' habits, problems during the DTP system usage, etc. the survey has been created. It was distributed electronically in an e-mail containing a hyperlink to an interactive PDF file (form). The latest snapshot (2.0beta) of OpenOffice.org Writer has been used to create this form.

The survey queried 135 3rd and 5th grade students about the DTP system they use for writing their thesis, their level of skills to handle this system and the opinion when is the right time to learn these skills. Only the students of daily study were surveyed, mostly the students of Faculty of Management and Economics.

The first question was about the DTP system a student had decided to write his/her thesis in. The student was given an option between Microsoft Word 97 or older, Microsoft Word 2000, Microsoft Word XP and newer, OpenOffice.org Writer, L^AT_EX or other (where, he/she was expected to add its name). The results (Figure 9) were as follows: L^AT_EX, OpenOffice.org Writer, Word 97 or older and other (unspecified) is used by students in 8 % of the cases altogether. Word 2000 uses 34 % of the surveyed students and 62 % uses Microsoft Word XP or newer (the most up-to-date is 2003 as of writing this work).

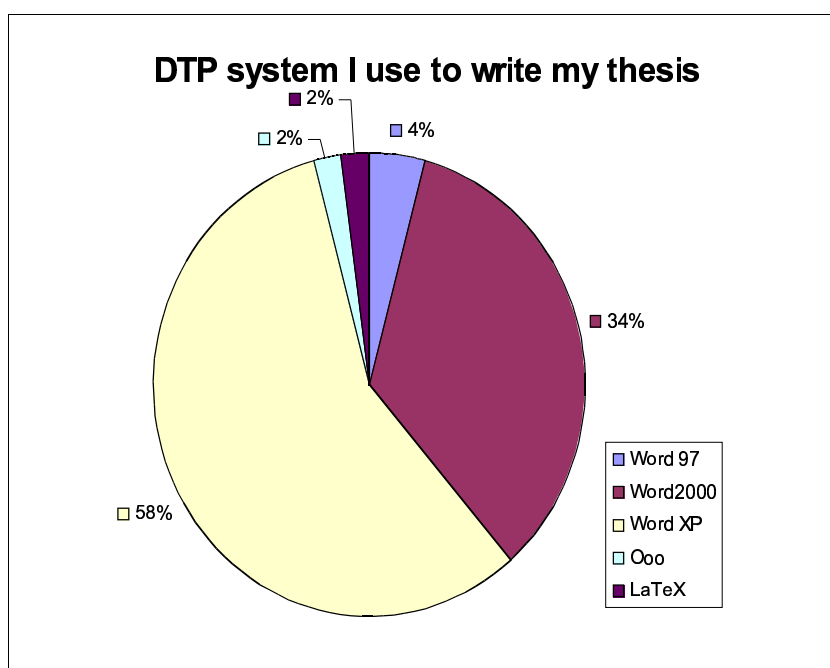


Figure 9. The DTP system I use to write my thesis

The next question consisted of 6 yes-or-no questions to give an impression on how the students manage and use the chosen system. The questions were formed as simple tasks that the interviewed subject is able or unable to perform. While there was no problem for students to set the first line indentation to 3 cm (94 % were able to perform this task), the inability to perform the task or understand it was between 38 % and 50 % for the following questions:

- Prepare the table of contents – 4 levels depth, then change back to 3 levels depth (38 %).
- Update the table of contents (42 %).
- Set the caption for figures/tables with the automatic numbering (50 %).
- Create a new caption for charts/source code/figure (45 %).
- Generate the list of captions (44 %).

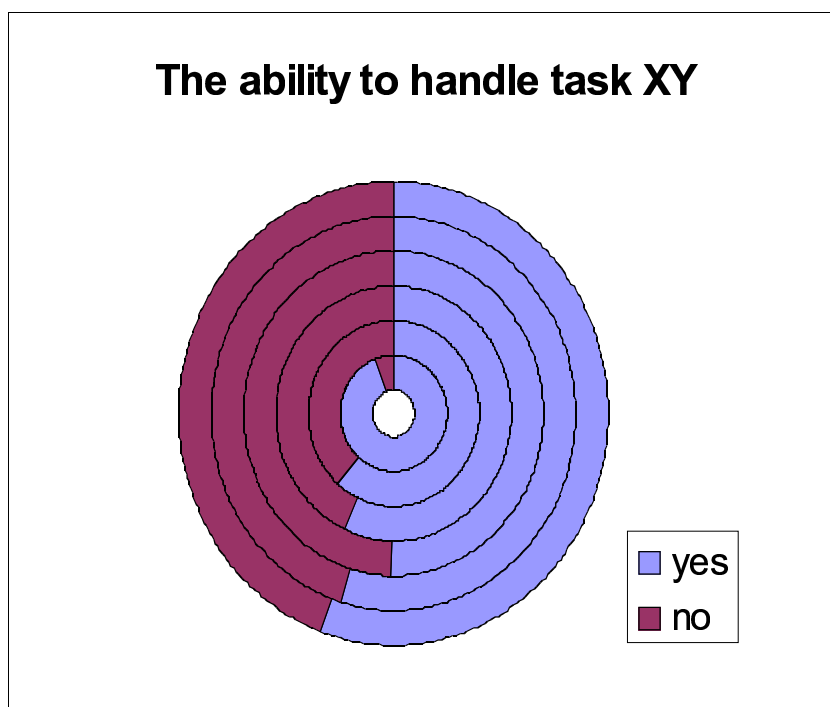


Figure 10. Ability to handle the typographic system

In the next question the students were asked what is the best time to acquire the missing skills so they would be able to perform the tasks. The option was to type either the grade the student believes is the best to learn and train these skills or check the box indicating it is not necessary. The 18 % think it is not a necessity, the average grade those who think it is a good idea to donate a lessons to learn these things at the University is 1.55. The 64 % think that the 1st grade would be the most appropriate, 22 % think it is the 2nd grade, 10 % are determined that the 3rd grade would be the best (Figure 11).

Grade to acquire DTP skills

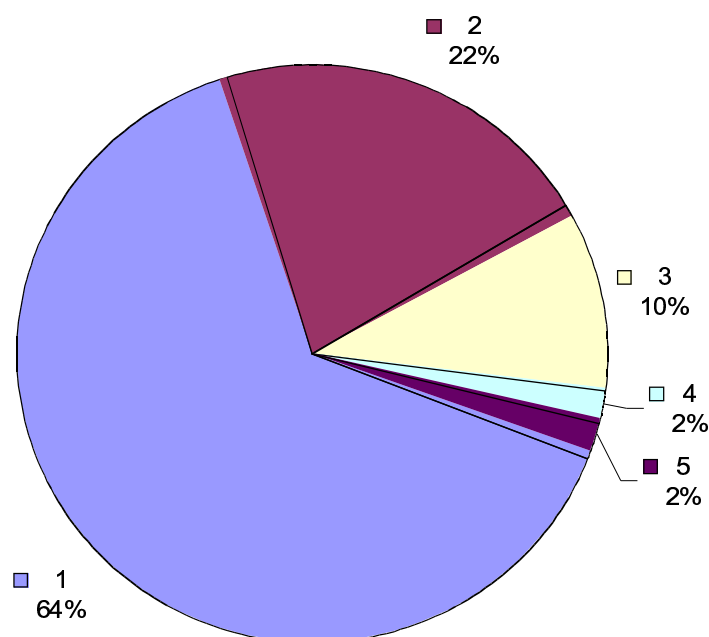


Figure 11. The grade to acquire DTP skills

The next set of questions were targeted to explore the good/bad habits writers have. The 1st question discovered the usage of styles versus the manual formatting of the single paragraph(s). Especially for larger works, the usage of styles is definitely recommended, as it may save considerable amount of time during the changes in form of the document. According to the survey results the 56 % are still formatting the paragraphs manually.

The next question was to discover whether the writers are used to insert an empty paragraph between two paragraphs in order to create a vertical space between them. This is a common bad habit and should be avoided. The vertical space between paragraphs is set in the paragraph preferences (spaces before/after). More than a half students interviewed (52 %) has this bad habit.

Another question being put was whether the writer prepare the table of contents and numbers the headings manually (by adding the number prior to the heading title) or let the DTP system do the whole thing, or at least one of the tasks. The results here were more optimistic as 56 % use automatic numbering and table of contents creation and 23 % use the DTP system for one of these tasks.

According to the results, only 12 % type the thesis at the University library, the remaining 88 % type it either at the campus or at home.

At the time the survey was taking place, the students had already chance to download and use the updated template at least for Microsoft Word and/or OpenOffice.org Writer. They were asked on how much they find it useful. The results can be seen in Figure 12.

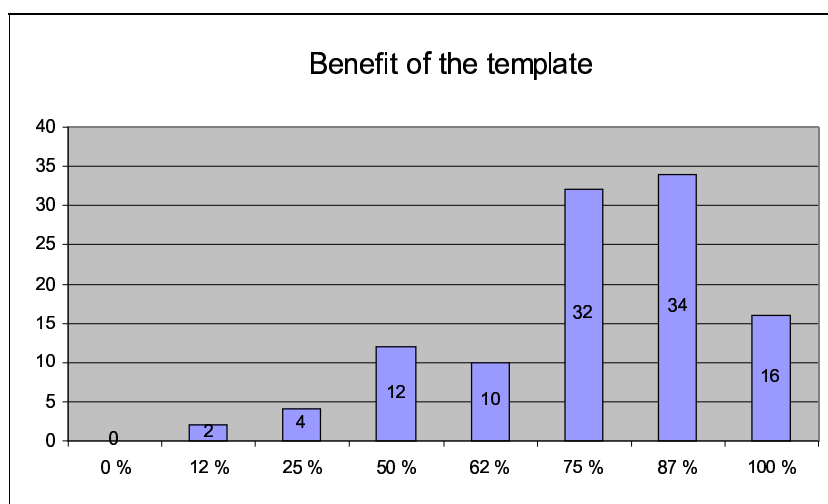


Figure 12. The benefit of the template

I wanted to see how sex affected the ability to manage the DTP software for students writing their thesis at different places (library vs home desktop vs home notebook). Table 6 is a two way ANOVA with two independent variables: Sex (Men/Women) and the place where the student writes his/her work. The dependent variable is the total score in points. Points were assigned to each of the tasks according to the difficulty to perform them (measured on a scale of 1 to 3).

	library	home-desktop	home-notebook
M	10,0000	16,1714	11,2727
W	13,7778	13,1964	15,1875

Table 6. Two-factor ANOVA

Hypothesis $H_0(a)$ presumes that sex effects the score, hypothesis $H_0(b)$ presumes that the type of ownership effects it. A two-way ANOVA would test whether the possible main effects are statistically significant—that the results aren't from sampling error alone.

MS Excel was used for computation and its results are shown in Table 7.

Summary	Count	Sum	Average	Variance
M	3	37,44416	12,48139	10,61727
W	3	42,16171	14,0539	1,048275
library	2	23,77778	11,88889	7,135802
home-desktop	2	29,36786	14,68393	4,425313
home-notebook	2	26,46023	13,23011	7,662723

ANOVA

Source of variation	SS	df	MS	F	P-value	F crit
Rows	3,709214	1	3,709214	0,478157	0,560741	18,51276
Columns	7,816472	2	3,908236	0,503813	0,664976	19,00003
Error	15,51462	2	7,757312			
Total	27,04031	5				

Table 7. ANOVA – Summary

According to the results there are no real evidences against the null hypothesis for $\alpha=0.05$. That means the influence of sex or the ownership of the computer is not statistically significant.

The last question was open. The students were encouraged to describe what are they having problems with while editing the formal look of their work. Though the descriptions varied a lot, it was possible to create some common categories of problems.

The next paragraphs will be structured as questions (problems) sorted according to the frequency of occurrence followed by the answer (solution).

1. Figures – numbering, referencing, Word not able to keep them on the position when manipulating the text.

The experience revealed the best way to format figures is:

- avoid wrapping text around figures (for external picture files)

Word: See menu Format – In text.

OpenOffice Writer: Anchor – As character.

Place figure at the separate line, set center alignment and Keep with the next paragraph option in the paragraph. The next line is dedicated to the caption text (automatically numbered).

- set text wrapping above and after figure (for Word drawing object)

Always group elements of the drawing so to avoid their breaking over pages.

- do not place captions inside the text-box (be aware: MS Word automatically does this when you select Insert – Caption when the text is wrapped around the figure) -

the caption items won't be included in the generated figure list that way.

- if you have to wrap the text around:

Format – Text flow – Close – Choose right or left. Do not use other wrapping styles unless you know what you are doing. Ignore the caption – it tends to get apart from the figure.

2. Every time I copy Excel table to Word I have to reformat it (adjust font, cell size, frames)

Do not use plain Ctrl+C (Edit – Copy) and Ctrl+V (Edit – Paste) function. Instead of Ctrl+V first format the table in Excel the way how you would like to look in Word. Then Ctrl+C in Excel, in Word choose Edit – Paste special, GDI metafile. You won't be able to edit the table in MS Word anymore but the formatting will be exactly the same as in MS Excel. You can stretch or shrink the table – it is embedded in vector format, thus it won't lead to any quality loss.

3. Cross-references, table of figures, table of content generation.

The how-tos for all these topics have been added to the webpage in form of Macromedia Flash animation.

4. Problems with text formatting when the text is pasted from the webpage.

Paste text as unformatted text (Paste special menu). Remove eventual soft line breaks and apply styles where appropriate.

5. The document changes when transferred to another PC (with another Word version).

This is rather hard to cope with. Try to use the same Word version, if you apply some of the above-mentioned rules during the writing of your thesis, you won't get into too much trouble if your document slightly changes anyway.

4.2 The Conclusion

The survey showed that the majority of students are not able to manage the DTP system they use for writing the thesis well. They should be better informed about the capabilities and possibilities of the DTP system they use – that is, in about 90 %, Microsoft Word text editor. The other DTP systems creating the remaining 10 % are: OpenOffice.org Writer and L^AT_EX.

Apart from the problems mentioned in the survey there appeared some others, that I would call mysterious and the answer was unfortunately not found. The students encountered

crashes when adding MS drawing objects into a template in few cases, in one case the student was unable to load her work in MS Word 2000 previously saved in MS Word XP (as though Microsoft claims the format compatibility).

To support the answers to some rather frequent questions (like table of contents generating or bibliography referencing) a webpage has been created containing instructional Macromedia Flash animations created using vnc2swf program. This step was welcomed by the students.

5 DTP SYSTEMS

Expectations were confirmed by the survey that showed the majority of students is using Microsoft Word for the DTP work at the University. The next two DTP systems were however included in this analysis due to these two key features: they are both available for free, and also may be used for the commercial activities (some large companies have already switched from MS Office to OpenOffice.org) and they produce the quality typographic output, comparable (or even better) with the one from MS Word.

Other professional DTP systems like for example Adobe InDesign or QuarkXPress were not included, despite the fact they are used at Faculty of Multimedia Communications, because of their nature – they are not intended for home or office use (their price for license is a sufficient indicator).

5.1 Microsoft Office

Microsoft Office is a product of Microsoft Corp. The Microsoft Office suite exists for all currently used Windows versions (starting with Windows 95) + MacOS. There are no known plans for native versions for the Linux, Un*x or BSD platform (or their clones). Nevertheless it can run in emulated mode on these platforms thanks to Wine or Crossover project. The graphical user interface (GUI) is uncluttered, the application response is quick even on older computers. The functions are rich enough to cover the needs of common office computer user. The contents of the suite differs on particular version but these basic components are always included: MS Word (word processor), MS Excel (spreadsheet), MS PowerPoint (presentations), MS Outlook (e-mail client).

In present time, the usage of this package is so worldwide that the documents created by this software are the de facto standards between common computer users. However, to become standards de jure Microsoft would have to suffer the change in one of its main principles – the specifications would have to be opened public. This is not the case until the present time as the company tends to build on proprietary and closed-source development model. The non-availability of the document format specifications make the development of software products able to read or write these documents harder, however not impossible. This is when reverse engineering comes to a word, sometimes referred to as reversing. The reverse engineering however may be the subject to a legal action in some countries creating an obstacle for the development using these principles.

5.2 OpenOffice.org

The OpenOffice.org suite (OpenOffice later on) is a suite comprising of word processor, spreadsheet, presentation and drawing application. It was derived from the source codes of StarOffice suite – the commercial office bundle created by Sun. The source codes were put under an open source license which means that the software is available for no costs to anyone and the sources may be modified to add/enhance the functions. The only restriction that applies is that the application (either modified or not) may only be distributed under the same license and with the source codes included. That is to protect this software development model from the code robbery.

It is possible to compile the suite for the major architectures: Intel 32 and Macintosh, the version for 64-bit architecture is a work-in-progress. The following operating system are known to work: Windows 9x – XP (the version for Windows 95 is considered obsolete, at least Windows 98 are recommended), any Linux with 2.4.x/2.6.x kernel series, Apple Mac-OS X, IBM OS/2, SGI Irix and Sun Solaris.

The format specification for each of the document created by OpenOffice is publicly available. It is basically a compressed file (ZIP compression) containing at least one XML file, along with other files of relevance to the document (such as images, and possibly other OpenOffice files).

The Open document format (OASIS) is the new document format specification that will be supported by the upcoming OpenOffice version 2.0. In July 2004 it was proposed as ISO standard format upon the recommendation of the European Commission. Sun's President and Chief Operating Officer Jonathan Schwartz reaffirmed Sun's commitment to open standards and the belief that "documents you create are your property ... and they should therefore be stored in well-designed, truly open, long-lived and sharable data formats which can be retrieved and re-used by future generations." [9]

OpenOffice.org suite may be downloaded from the project webpage², Czech localized version is available at the Czech localization OpenOffice.org project webpage³.

5.3 TeX

TeX is a professional typesetting system. It was created in late 1970 by Mr. Donald Knuth who was dissatisfied with the state of the typography system he used in his book *The Art of Computer Programming*.

² OpenOffice.org, available online at <http://www.openoffice.org>

³ Oficiální portál pro uživatele OpenOffice.org, available online at <http://oo.o.cz/>

As TEX is fairly unusable in its bare form, various programs grew out of it. One of many is L^AT_EX created by Mr. Leslie Lamport. It is however only an extension, the main part of the job is still done by TeX. Its input is a text file created by any text editor. This text file contains the content user wants to be typeset as well as the formatting marks. The main difference between the two above-mentioned DTP systems is that TeX is a non-WYSIWYG system. While many beginners may see this as an unbearable obstacle in learning and understanding this system, this feature has also certain advantages. To name some of them:

- user may use any text-editor, he/she is not dependent neither on platform, nor architecture, there are some text-editors dedicated particularly to writing TeX/L^AT_EX documents,
- lower investment in computer technology (TeX is running flawlessly on older computers),
- user knows exactly what the document contains, no unwanted hidden features included,
- smaller document files, easier distribution, possibility of commenting every line of the document.

Of the three mentioned DTP systems, TeX is the most advanced and powerful. While it is not so trivial to write a TeX as it is not a WYSIWYG system, once one get to know the basics, he/she will find it pretty simple.

The TeX system usually produces a device independent file (.dvi). DVI files are not intended to be human-readable; they consist of binary data describing the visual layout of a document in a manner not reliant on any specific image format, display hardware or printer. DVI files are typically used as input to a second program (called a DVI driver) which translates DVI files to graphical data. For example, most TeX software packages include a program for previewing DVI files on a user's computer display; this program is a driver. Drivers are also used to convert DVI files to popular document formats (e.g. PostScript, PDF) and for printing. [8]

The figure 13 shows the process of creating human readable output out of the TeX document.

The easiest way how to obtain TeX is either order CD with TeX Live distribution (TeX for Windows, Linux and Macintosh platforms) from the local TeX user group⁴ or download it

4 That is Czechoslovak TeX Users Group for the Czech Republic – <http://www.cstug.cz/>

from the CTAN⁵.

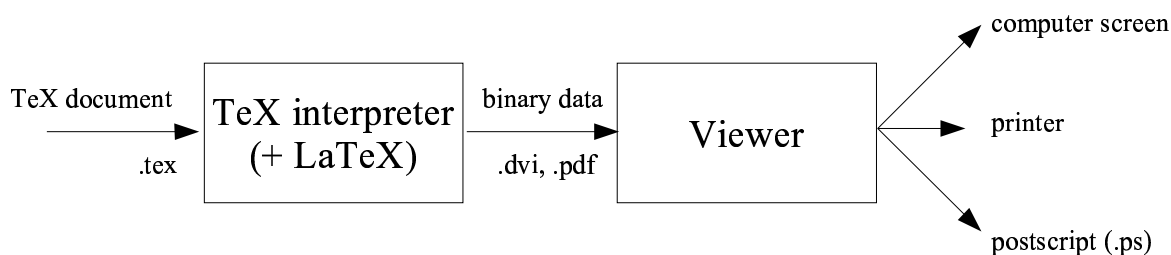


Figure 13. *TeX – how it works*

5.4 SWOT

This section presents a SWOT analysis of all three DTP systems. It was created upon the results of the survey, author's experience and observations. While it is far from being complete, it may give you an estimate view on what you should (not) expect from the specific system.

5.4.1 Microsoft Word

Table 8. *SWOT analysis: Microsoft Word*

<i>strengths</i>	<i>weaknesses</i>
• huge user-base, created by solid company • recognized as a standard for documents exchange • stability, development history, • wide variety of templates, created documents, • 3rd party extensions (e. g. dictionaries)	• format incompatibility between the other programs or even various Word versions • some default settings (autocorrections, autoformat) are annoying • newer versions require newer hardware or OS • the newer versions tend to create unstructured document

⁵ the Comprehensive TeX Archive Network, available online at <http://www.ctan.org/>

<i>opportunities</i>	<i>threats</i>
• detectable desire for other than Windows/Mac versions (CrossOver) • better multilingual support for UI • creating complex document flow systems based on MS documents (security options, signing, reporting) • better UI for handicapped persons (voice control, mouse-less control)	• other user friendly DTP systems for home/office use (OpenOffice, TextMaker).

5.4.2 OpenOffice Writer

Table 9. SWOT analysis: OpenOffice Writer

<i>strengths</i>	<i>weaknesses</i>
• heavily based on styles, allows to create well-structured documents • available for free • runs on various platforms • the file format is compressed XML file (open specification), easy to parse • supported by Sun Inc. + some other companies	• charts created in oocalc (spreadsheet) might not satisfy more demanding user, excel charts inserted as a vector objects suffer from bad font display • requires stronger hardware (memory consuming) • compatibility with MS Office document formats is not 100% (and most likely will never be)
<i>opportunities</i>	<i>threats</i>
• ISO on document file format) • cooperation with 3rd party plugins/extensions • ability to properly import MS Office macros (bibliography, dictionaries)	• patent related questions

5.4.3 TeX

Table 10. SWOT analysis: TeX

<i>strengths</i>	<i>weaknesses</i>
• advanced typesetting algorithms (line breaking, page breaking, floating environments) • ideal for writing texts containing lot of mathematics • free • extensible via macros and/or packages • good user support (forums, mailing lists), local TeX/L^AT_EX user groups • independent of architecture/system • absolutely transparent document format, highly unlikely to get broken (if so, may be fixed easily)	• non-WYSIWYG style of writing may be an obstacle for many users • in some cases (L^AT_EX) the documentation is scattered • not suitable for shorter documents with a weak structure • user has to be aware of some package incompatibilities
<i>opportunities</i>	<i>threats</i>
• UTF-8 encoded files support • gaining more public awareness	• may lose some attractiveness after time as no new functions are added, only bugs are being fixed

6 THE DIFFERENCES BETWEEN THE DTP SYSTEMS

This chapter will provide the information thanks to which it would be possible to understand some differences between the mentioned DTP systems. The author will describe the most major differences to allow easier redesign of templates in the future. More detailed description of the differences would however exceed the intended scope of this work and it is not considered the main goal.

6.1 Page Layout

The page layout properties specify such variables as margins, header/footer placement, space for the main body, floating object etc. For the purpose of better explanation, the illustrations of type area were created and are available as appendices 1, 2 and 3. To avoid confusions, blind tests and for validation purposes, table 11 should be helpful.

Table 11. Page layout – conversion table

<i>MS Word</i>	<i>OpenOffice Writer</i>	<i>TeX</i>
Margins – From edge – Header	Page – Margins – Top	1 inch + \voffset + \topmargin
-	Header – Height	\headheight
Margins – Top (+ Gutter + Header height ⁶)	Page – Margins – Top + Header – Height + Header – Spacing	1 inch + \voffset + \topmargin + \headheight + \headsep
Margins – From edge – Footer	Page – Margins – Bottom	paper height – (1 inch + \voffset + \topmargin + \headheight + \headsep + \textheight + \footskip)
Margins – Bottom (+ Footer height ⁷ + separator)	Page – Margins – Bottom + Footer – Height + Footer – Spacing	paper height – (1 inch + \voffset + \topmargin + \headheight + \headsep + \textheight)
-	Footnote – Maximum footnote height	-
Margins – Left (+ Margins – Gutter)	Page – Margins – Left	1 inch + \hoffset + \oddsidemargin (\evensidemargin)
Margins – Right	Page – Margins – Right	paper width – (1 inch + \hoffset + \oddsidemargin (\evensidemargin + \textwidth))

⁶ it is not possible to set fixed header height size

⁷ it is not possible to set fixed footer height size

Be aware of the fact, that MS Word does not allow you to create header or footer of fixed size, those values are based on the number of lines, paragraph or inserted objects properties.

For TeX it is recommended to set the distances in the document preamble (using `\setlength` command).

6.2 Paragraphs, Spacing, Leading

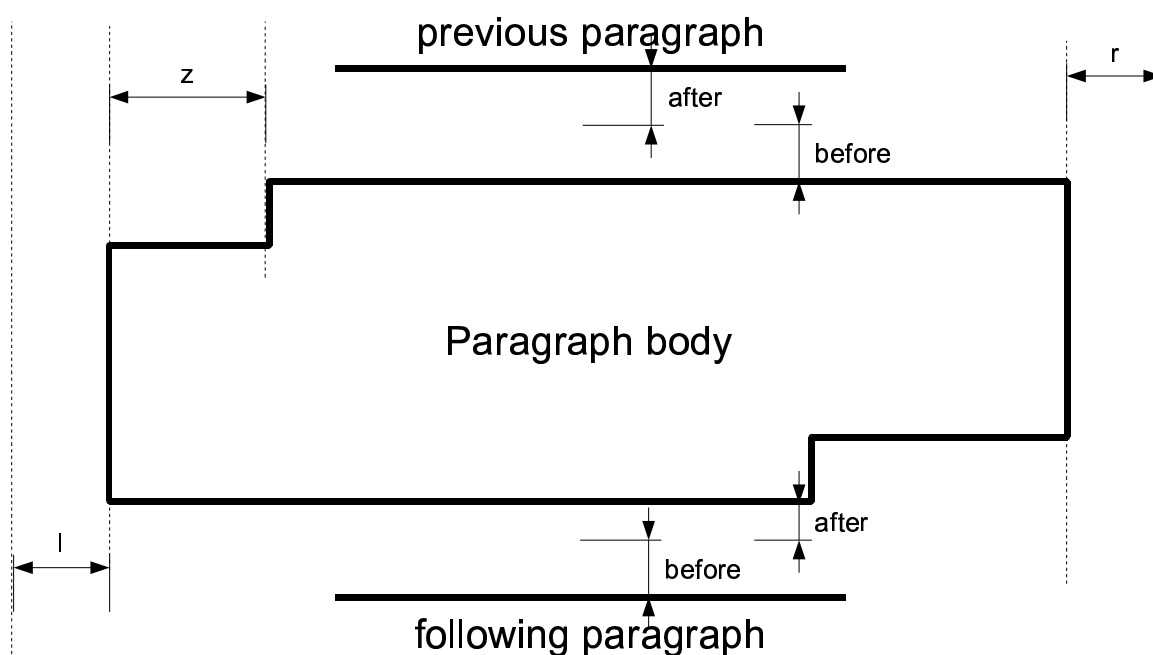


Figure 14. MS Word, OpenOffice Writer – paragraph 1

Figures 14 and 15 depict the paragraph measures used by Microsoft Word and OpenOffice Writer. The vertical space between paragraphs is computed either as a sum of after and before dimensions (if the option *Use automatic paragraph spaces in HTML format* – MS Word or *Add spacing between paragraphs and tables* – OpenOffice Writer is set to on) or equals to greater value of these two (Fig. 15). The information about the actual paragraph setting is stored within the document file.

Dimension “z” is a first-line indentation. Rybicka [3] writes that its usual size is 1–2 em (depends on the width of typeset) and is of same width for the whole document, even for paragraphs typeset in different typeface (e. g. footnotes). If we chose zero first-line indentation, we either have to assure that the last line of the paragraph is at least 1 em shorter than the paragraph width (which is truly difficult) or we set the horizontal paragraph spacing to a non-zero value. The optimum spacing is about one half of normal leading.

The “l” and “r” dimensions present left and right margin from the text body area. Table provides an overview on how these dimensions may be adjusted.

<i>Dimension</i>	<i>Word</i>	<i>Writer</i>	L ^A T _E X
<i>l</i>	Paragraph – Left margin	Paragraph – Before text	<code>\leftskip</code>
<i>r</i>	Paragraph – Right margin	Paragraph – After text	<code>\rightskip</code>
<i>z</i>	Paragraph – First line	Paragraph – First line	<code>\parindent</code>
<i>after/before</i>	Paragraph – Above paragraph	Paragraph – Above paragraph	–
	Paragraph – Above paragraph	Paragraph – Above paragraph	–
<i>v</i>	–	–	<code>\parskip</code>

Leading is, as was explained in the theoretical part, the distance between the two baselines. The optimum distance ranges between 10–25 % of the font size. So that, for example: for 10 pt font size the distance between baselines is 12 pt. The actual distances for various font sizes can be seen at table 12. As one can observe, the values vary not only according to the font size used but also through the DTP systems. It is therefore virtually impossible to create 100 % identical document using two different systems.

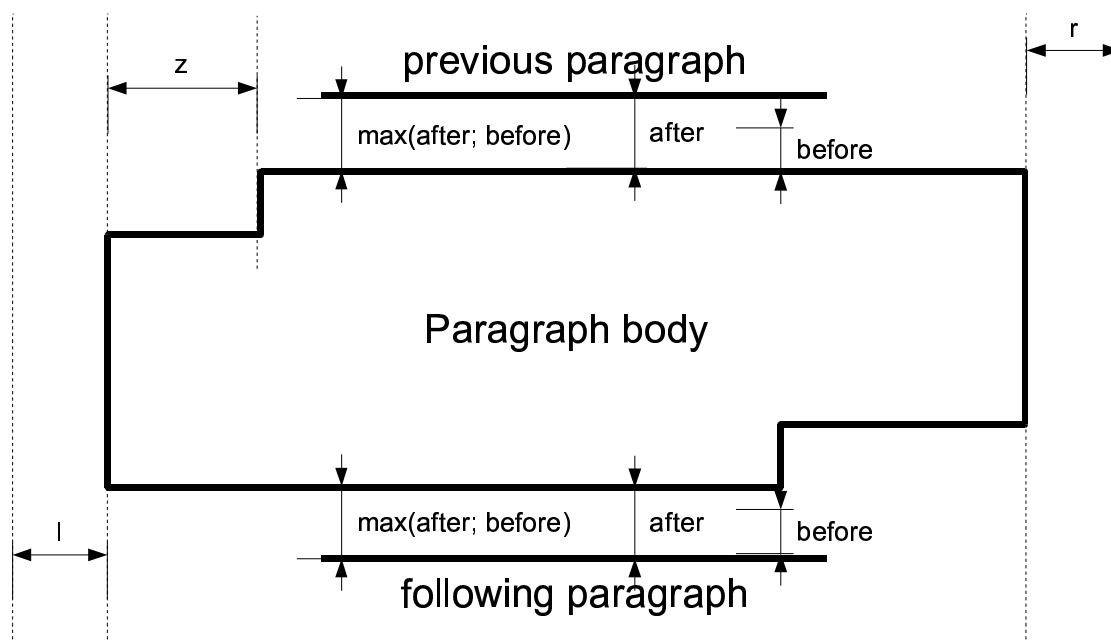


Figure 15. Word, OpenOffice Writer – Paragraph 2

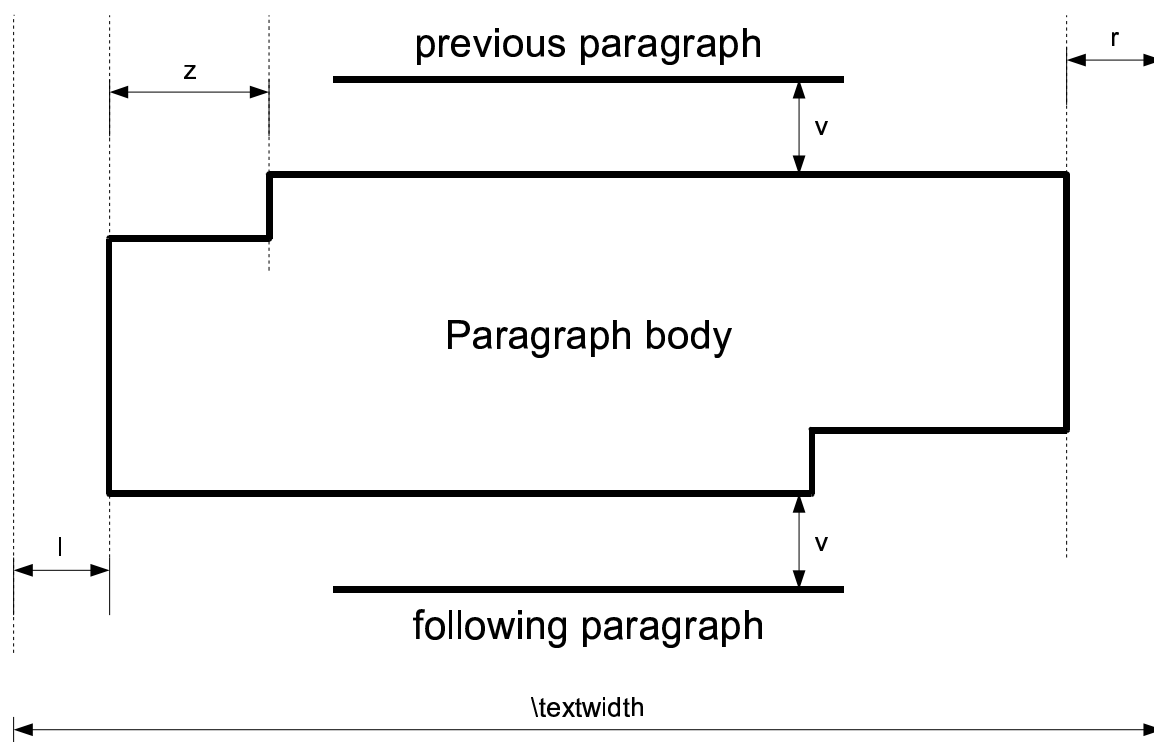


Figure 16. LaTeX – paragraph

Table 12. Comparison – Leading in pt for various font sizes (Times New Roman)

	MS Word				OpenOffice.org				TeX	
	single		1.5		single		1.5		single	
	pt	%	pt	%	pt	%	pt	%	pt	%
10 pt	11,5	15	17,1	71,1	11,3	13,0	16,8	68,0	12,0	20
11 pt	12,65	15	18,8	71,1	12,5	13,6	18,5	68,2	13,2	20
12 pt	13,8	15	20,5	71,0	13,7	14,2	20,5	71,0	14,4	20
14 pt	16,1	15	24	71,4	15,85	13,2	23	64,2	16,8	20
18 pt	20,8	15	31	72,2	20,3	12,8	29,5	63,9	21,6	20
24 pt	27,6	15	40,1	67,1	27,2	13,3	40	66,7	28,8	20
ø	–	15	–	70,7	–	13,35	–	67	–	20

6.3 Ordered and Unordered Lists

The lists is another area where the mentioned DTP systems rather differ. MS Word offers customized bullet symbols for a list (including images), alignment, fonts, indentation from the left body margin, numbering depending on the previous levels/lists, link specific level to the paragraph style, space between the bullet and the item and up to nine separate levels of items. Bullets and numbers may be combined within one list. Several numbering styles

are provided (like for example: “i; ii; iii; iv” or “the first; the second; the third”). To move one level down or up, Tabulator key or Shift + Tab is used, respectively. The typography recommends to use only a few styles for multilevel lists, thus the best thing would be to prepared only a limited set of list types so it would be harder for the writer to create too many differently looking lists. It is possible to create up to 7 styles for the multilevel lists, but in order to have them saved in the template it is essential to link them with the paragraph style(s).

OpenOffice Writer, in contrast, does not require to link paragraph and numbering/bullets style, these styles are completely independent. However, it is still possible to link them so it is possible to set a paragraph style that would be always numbered. The number of numbering styles does not seem to be limited. The other features correspond to the ones MS Word has.

L^AT_EX's approach is vastly different. By default, there are two environments that allow to create enumerated/bulleted lists. Those are: *itemize* and *enumerate*. The maximum level for the nested list is 4. For the *article* style the default look of the *itemize* and *enumerate* environments is depicted in Figure 17. As can be seen, `\begin{itemize|enumerate}` and `\end{itemize|enumerate}` commands define the boundaries of the list. Line beginning with `\item` followed by a user defined text specifies the list item. The `\item` command has an optional argument, that changes the default bullet into a user defined character. So `\item[xxx] Text sample` would result in:

xxx Text sample

Source:	L ^A T _E X output:	Source:	L ^A T _E X output:
<code>\begin{enumerate}</code>		<code>\begin{itemize}</code>	
<code>\item Level one - 1st item</code>		<code>\item Level one - 1st item</code>	
<code>\item Level one - 2nd item</code>	1. Level one - 1st item	<code>\item Level one - 2nd item</code>	• Level one - 1st item
<code>\begin{enumerate}</code>		<code>\begin{itemize}</code>	
<code>\item Level two - 1st item</code>	2. Level one - 2nd item	<code>\item Level two - 1st item</code>	• Level one - 2nd item
<code>\begin{enumerate}</code>		<code>\begin{itemize}</code>	
<code>\item Level three - 1st item</code>	(a) Level two - 1st item	<code>\item Level three - 1st item</code>	– Level two - 1st item
<code>\item Level three - 2nd item</code>	i. Level three - 1st item	<code>\item Level three - 2nd item</code>	* Level three - 1st item
<code>\begin{enumerate}</code>		<code>\begin{itemize}</code>	
<code>\item Level four - 1st item</code>	ii. Level three - 2nd item	<code>\item Level four - 1st item</code>	* Level three - 2nd item
<code>\item Level four - 2nd item</code>	A. Level four - 1st item	<code>\item Level four - 2nd item</code>	· Level four - 1st item
<code>\end{enumerate}</code>	B. Level four - 2nd item	<code>\end{itemize}</code>	· Level four - 2nd item
<code>\item Level three - 3rd item</code>	iii. Level three - 3rd item	<code>\item Level three - 3rd item</code>	* Level three - 3rd item
<code>\end{enumerate}</code>		<code>\end{itemize}</code>	
<code>\item Level two - 2nd item</code>	(b) Level two - 2nd item	<code>\item Level two - 2nd item</code>	– Level two - 2nd item
<code>\end{enumerate}</code>		<code>\end{itemize}</code>	
<code>\item Level one - 3rd item</code>	3. Level one - 3rd item	<code>\item Level one - 3rd item</code>	• Level one - 3rd item
<code>\end{enumerate}</code>		<code>\end{itemize}</code>	

Figure 17. Enumerate and itemize environments (LaTeX)

Every aspect of list is defined in the style the document uses. It is not trivial to redefine the defaults settings (one has to redefine the environment using `\def` or `\renewcommand` commands), however left indentation of the items may be changed quite easily in the document preamble defining length registers `\leftmargini...``\leftmarginiv`. The vertical space between two items may be changed using `\itemsep` command in the document body (`\itemsep 3cm`). In both MS Word and OpenOffice Writer, the vertical spaces between list items are read from the paragraph properties.

Another $\text{\LaTeX}$ environment that may be of use in certain cases is *description*. It is useful for writing definitions. The `\item` command's optional argument holds the word entry. The description immediately follows.

6.4 Embedded Graphics

It is absolutely crucial to support the insertion and handling of graphic formats for DTP systems as many of information comes in form of the graphics (schemes, illustrating photos, charts etc.). Word and Writer support the wide range of commonly used raster and vector graphic formats (including gif, png, jpeg, eps). Non-supported format may be converted using such tools as Imagemagick's `convert`⁸.

MS Word recognizes drawing object (creating using internal drawing editor) and an external picture file (including the clipart object, which is basically regular wmf file format picture). Different restrictions apply on these objects. Table 13 lists them, as well as the possible workaround(s). The writer should consider whether or not it would be more appropriate to prepare the graphics in the external program (e. g. CorelDraw) and then import it into the document.

OpenOffice Writer handles the drawing object and picture in different fashion. The differences are listed in table 14.

Table 13. MS Word – drawing object vs external picture restrictions

<i>Feature</i>	<i>Drawing object</i>		<i>External picture</i>	
	<i>capability</i>	<i>workaround</i>	<i>capability</i>	<i>workaround</i>
rotate	any angle	–	–	external graphic editor
contrast/brightness	no	changing color of separate drawing elements	yes	–

⁸ <http://www.imagemagick.org>

<i>Feature</i>	<i>Drawing object</i>		<i>External picture</i>	
	<i>capability</i>	<i>workaround</i>	<i>capability</i>	<i>workaround</i>
“in text” wrapping	no	alternative: up and down	yes	–
caption	no	textbox + add new line containing caption	yes	–
group several objects	yes	–	–	external graphic editor
borders, shade	no	textbox (borders)	yes	–
layers	yes	–	–	textbox
crop	no	–	yes	textbox with invisible borders
wrapping contours	no	–	yes	–

Table 14. OpenOffice Writer – drawing object vs external picture restrictions

<i>Feature</i>	<i>Drawing object</i>		<i>External picture</i>	
	<i>capability</i>	<i>workaround</i>	<i>capability</i>	<i>workaround</i>
rotate	any angle	–	limited (flip)	external graphic editor
contrast/brightness	no	changing color of separate drawing elements	yes	–
“in text” wrapping	yes	–	yes	–
caption	added to framebox	–	yes	–
group several objects	yes	–	–	external graphic editor
borders, shade	no	framebox	yes	–
layers	yes	–	yes	–
crop	no	–	yes	–
wrapping contours	partially (may not be grouped)	–	yes	–

A workaround means that if the feature is not (fully) supported, there is a way how the action may be performed using a different approach or technique. Please note that neither Word nor OpenOffice is able to add footnote inside the frame. Especially for OpenOffice Writer it is a significant downside as it is common for this system to use frames for figures (in order to keep figures and their captions tied together). L^AT_EX supports no floating

footnotes. It means it should not be the part of figure or table environment. You can insert the footnote anyway, but it's often not on the same page!

L^AT_EX's *picture* environment lets user to create an illustration using commands describing simple geometrical objects, such as lines, splines, rectangular areas, arcs etc. From these basic building elements, more complex structures may be built. The description of this topic however would exceed the scope of this work, so I will concentrate on the other way how to insert figures into a L^AT_EX document – that is – using an external image file.

In L^AT_EX it is not commonly possible to insert a jpg or pdf file directly into a document, only EPS files (in fact, other formats are supported by PDFL^AT_EX). To insert other image formats you have an option to convert it to EPS using a conversion program. The most known package for EPS images handling is `graphicx` (use `\usepackage{graphicx}` in the preamble). It enables the writer to use command `\includegraphics [key=value]{picture.eps}` to embed `picture.eps` file at the particular place in the document. The optional arguments (key values) define the scale, width/height, rotation in angles, crop margins. By default the figures are placed on the page without wrapping.

Unlike Word and Writer L^AT_EX provides a floating environment for graphic objects (as well as tables), which was created to liberate user from the need of checking the proper position of the figure or table as the document changes. Floating environment will assure that the embedded object will appear at the best place in the text possible. Some restrictions apply however, as L^AT_EX was not designed from the scratch to meet the requirements of a figure wrapped by the text. There are additional packages that partially solve this problem. The `wrapfig` package is one of such. It allows user to typeset a narrow float at the edge of some text, and then make the text wrap around it. Although the environments have ability to “float”, no provision is made to synchronize them with regular floats. Thus, one must be aware that they may be printed out of sequence with standard floats. The situation may be corrected by adding the `float` package and revising each regular floating object—but not the `wrapfigure` or `wraptable` objects—to specify the `Here` placement option. Another alternative packages that support text wrapping are `picins` and `floatfig`.

7 POSSIBILITIES OF RAISING FORMAT QUALITY OF THE THESIS

7.1 Conversion To LaTeX

7.1.1 Why Bother?

Why should one consider converting the Word/OpenOffice Writer document into a LaTeX system when LaTeX is so user unfriendly? The answer is individual. If you are experiencing crashes of your DTP system, together with data loss, have to had to switch to the older piece of hardware, the publishing house forces you to use LaTeX (or simply more advanced typesetting program than MS Word), you are frustrated with the capabilities of your DTP system, the LaTeX might be a good choice.

Although Word is a useful and practical tool for writing short and simple documents, it becomes too complex or even unusable when one wants the word processor to do more complicated tasks. LaTeX does require more effort and time to learn to use even for simpler tasks, but once learned, difficult tasks can be accomplished rather easily and straightforwardly. Therefore, LaTeX is simpler, faster and better way to produce large or complex documents and the additional effort eventually pays off. Additionally, LaTeX is especially well suited for scientific and technical reports, even shorter ones. Writing just one thesis will pay off all your additional effort.

The next sections will ponder on situation where the LaTeX document is not written “from the scratch” but either MS Word or OpenOffice Writer is used as a starting point. The possibleness of conversion from an existing format will be evaluated by taking a reference set of thesis and the LaTeX output will be matched against the output of the original program. The three conversion programs will be the object of analysis: Doc2TeX, Writer2 LaTeX and Rtf2LaTeX. Each one of them will be briefly introduced at the beginning of each subsection.

7.1.2 The Methodology

At first, 10 complete or almost complete thesis were collected from my fellow students. Then, the non-standard pages were dropped (title pages, abstract, appendices) – the first page was the Table of contents. The sample works have been numbered and the information about their structure has been put into a table so to give reader a general

summary of the analyzed subjects.

The following aspects of the text were studied: tables, figures, table of contents, ordered and unordered list, bibliography list, list of figures/tables. The samples include 10 Word documents, 2 documents written in OpenOffice Writer. Table 15 presents the structure of each one of them.

Table 15. The structure of the analyzed documents

<i>No.</i>	<i>Pg</i>	<i>Chars</i>	<i>Lines</i>	<i>Bib</i>	<i>Lists</i>	<i>Pictures</i>	<i>Tables</i>	<i>Formulas</i>	<i>Refs</i>	<i>Footnotes</i>
1	91	129 342	3742	12	24	8	22	-	35	-
2	85	148 135	2338	-	42	6	5	-	-	-
3	68	120 521	5774	-	9	10	45	2	-	1
4	81	91 924	2334	28	1	52	11	236	10	-
5	121	178 563	5260	17	15	8	65	15	-	-
6	88	111 922	2586	12	50	2	10	-	-	-
7	65	85 749	1478	-	22	22	1	-	-	-
8	56	70 823	1210	16	37	9	1	-	17	-
9	94	119 260	1139	21	49	42	3	-	21	-
10	76	114 718	1386	20	23	61	27	2	20	3

The character count includes spaces. The extra empty lines (that occurred many times and should be avoided) were included in the total line count. The column entitled *Bib* includes the sum of the references (of all types) listed at the end of the publication. In the table both ordered and unordered list is classified as a list, the minimum number of entries is set to 2. The pictures list any graphic objects, except for the tables and formulas (created using MS Word) that are summarized in the following column. Only the Equation editor objects were considered as formulas, if the formula was created using the standard text formatting, it was omitted. Column entitled *Refs* lists automatic generated references to either bibliography entries. If the converter treated the reference as the regular text, it was considered correct (the presence of \ref command was not compulsory. The last two samples (No. 9 and 10) were the OpenOffice (1.1.4) documents, all the previous ones are created using of the Word versions (2000–2003).

Each program was set-up in the best manner so the resulting output would conform to the original as much as possible. The brief introduction of the programs and the description of their conversion capability follows.

7.1.3 Word2TeX

Word2TeX is a product of German company Chikrii Softlab. As the homepage⁹ states Word2TeX is a converter designed in order to use with Microsoft Word and enables Microsoft Word to save documents in L^AT_EX format. Few of the examples of documents successfully converted using this product are presented at the website. The program requires the presence of any Windows version 95 and higher and at least Microsoft Office 95.

Word2TeX translates following structure and formatting aspects of Word documents:

- text (including MBCS, has built-in customizable Unicode database),
- equations and references to equations (all versions of Equation Editor and MathType supported),
- color (in equations too),
- text formatting,
- paragraph styles,
- footnotes, endnotes (to L^AT_EX bibliography),
- index,
- multicolumn formatting,
- references, hyperlinks,
- figures (to EPS or EPDF),
- tables (including nested tables),
- lists and enumerations.

The program is licensed under shareware license. The full version costs \$ 99. The 30-day evaluation version is however provided for free with the following restrictions: only first 7 equations will be translated for every document; only one (first) table will be translated for every document and only one (first) figure will be translated for every document. For the object of analysis, the evaluation version is used. The untranslated objects were put into the separate documents so to allow their conversion and evaluation.

The resulting L^AT_EX was converted on a GNU/Linux system by L^AT_EX 2004 Live using tcslatex and dvipdf. The PDF file produced was compared with the original document. Version 3.0 was examined in this work.

First run explored that the some of the letters are encoded using L^AT_EX sequences. This makes the source document harder to read and causes problems in hyphenation. It is

⁹ <http://www.chikrii.com>

therefore highly recommended to use a convert program to recode it to other (for example ISO8859-2) encoding (`cstocs pc2 il2 file.tex | cstocs tex il2`). The table of contents is rendered as a formatted text – in this form, it is not really usable and should be replaced by `\tableofcontents`.

Nested numbered lists were translated correctly even when formatted as sets of independent single level paragraphs. The problem encountered only when an extra paragraph was used between the levels – the numbering was discontinued and was restarted after the paragraph. It seems that the program is unable to detect the continuation of the numbering after a new paragraph. Footnote was correctly translated.

An error was discovered during the compilation to the output format (dvi) – 2 extra newline characters in table specification kept the $\text{\LaTeX}$ away from the successful translation. The error was easy to fix (and the correction may be automated). Some tables are overlapping behind the right-page margin due to too long text in l column. The possible solution is to use `p{constant-width}` and specify the justification inside the individual cell or specify the justification for the whole column in the table preamble. The translation of the in-cell text justification behaved very strange – in fact, it almost did nothing. Other than these issues, the table translation was correct. There were no problems detected at the figure conversion.

Speaking of the formula conversion, the detected issue was the underscores “_” were not escaped inside the array environment. The second issue was invalid syntax for formula format: `\mbox{V}_\mbox{1}` – should have been `\mbox{\$V_1\$}`. The fix would need more time and TeX knowledge. The application was unable to manage the translation of footnote reference to placed inside a table cell (the footnote was ignored). Fields with automatically generated rank equations numbers were translated to the normal text, the tabulator between the equation and the number was ignored.

Microsoft Word drawing object was completely omitted. A bit more complicated table with merged cells were translated badly and the would need to be rebuilt (inappropriate use of `\multicolumn` commands). Table with tiny fonts in the cells, and many column were not rendered as expected, but this is not a converter's fault but rather a $\text{\LaTeX}$ feature. The text color inside the cells translated, the cell background color ignored. The different style of cell frame is ignored, simple line is used in all the cases. Another table with merged cells was translated correctly. Other need column width adjustments.

References are transformed into a regular (plain) text. Accented characters in math formulas were causing the $\text{\LaTeX}$ translator to stop.

7.1.4 Writer2 $\text{\LaTeX}$

Writer2 $\text{\LaTeX}$ is an OpenOffice.org Writer to $\text{\LaTeX}$ converter. Since the most of the samples were MS Word documents, it was necessary to load them in OpenOffice.org Writer and save them into sxw file format. This may, of course, lead to some distortions, giving that import/export capabilities of MS documents is not perfect. The configuration used to transform the document is included on the CD-ROM.

Badly formatted multilevel lists (formatted as single levels, see Fig. 18) are handled as multilevel ones – this leads to distortions (invalid numbering). The program was unable to detect a new paragraph between two list items, so after a new paragraph the numbering was always restarted. Figures inserted into an original Writer document (not converted from MS Word) are put inside the minipage environment, which is not ideal (should have been put into a floating environment). Drawing created in MS Word are either untranslated or need to be recreated because of obvious misinterpretation. Thus, the usage of these objects in MS Word is not recommended in regards of successful translation to $\text{\LaTeX}$ format.

- | | | |
|--|---|--|
| <ul style="list-style-type: none"> • numbering style 1, level 1 • numbering style 2, level 1 • numbering style 2, level 1 • numbering style 1, level 1 • numbering style 1, level 1 |  | <ul style="list-style-type: none"> • numbering style 1, level 1 • numbering style 1, level 2 • numbering style 1, level 2 • numbering style 1, level 1 • numbering style 1, level 1 |
|--|---|--|

Figure 18. Incorrect versus correct nested lists formatting

In few cases Writer was unable to correctly import section numbering, the fix was to remove the custom Numbering (Format – Numbering) and apply the relevant paragraph style. Figure and table captions are translated as normal text. The tiny font size used in some tables needs to be adjusted. The tabulators were ignored. Math objects were translated into a $\text{\LaTeX}$ mode, the automating numbering translated into a normal text. Math objects imported from Math Type™ are imported as drawing objects, and these objects are ignored.

Writer2 $\text{\LaTeX}$ seems to be a very promising project. Thought, the performance of this program depends on the OpenOffice.org import filters for MS Word, I did find the present combination of both very usable and efficient. There are of course still work to do, things

like floating objects are not handled at all, unfortunately the author of the project was not available to comment the future development.

7.1.5 Rtf2LaTeX2e

Rtf2LaTeX2e is a program that translates RTF (rich text format) files into LaTeX files. RTF file is Microsoft Word supported format, although it does not support all functions provided by MS Word doc format, it is the 2nd most compatible file format for Microsoft Word.

Rtf2LaTeX2e translates section number and section title separately, instead using one command for both. Some figures were converted to EPS, others were ignored, very simple tables were transformed correctly, merged cells are unsupported. TeX sequences are used in the output format, similarly as with the Word2TeX program (again, cstocs is advised to use). It is impossible to use customized paragraph styles as in two previously mentioned applications.

Table of contents is interpreted as separate lines of `\href` commands, it is recommended to replace them with single `\tableofcontents` command.

7.2 Summary

Both Writer2LaTeX and Word2TeX performed similarly. There were problems encountered when the nested lists were formatted incorrectly or there was an extra paragraph between the list items. Simple tables were interpreted with only small issues like missing borders, or incorrect justification. Word2TeX needs a small correction in the table header but it can be easily fixed and automated. The produced LaTeX code is quite comprehensible, however more optimizations could be done – for example floating table and environments could be used. Word2TeX produced problematic code that was not compilable at the first time and some touch-ups had to be made.

Runaway argument was too often an error output of a compilation process of the documents translated by Word2TeX.

The human factor was another problematic factor, that was making the conversion a bit more complicated. The proper knowledge of techniques how to create nested lists (possible stored together with the style inside the template), math equation editor, styles is absolutely essential. The MS Word drawing objects were stumbling-block – Word2TeX was unable to interpret them, with Writer2LaTeX it is possible to extract them from the document as

StarDraw object (thanks to OpenOffice import filters) but conversion is not satisfactory for more complicated structures and it requires time to reconvert it to other common graphic format (StarDraw format is obsolete and can be read only by the OpenOffice.org/StarOffice application).

7.3 Automated Searching and Removing of Typographic Errors

It is possible to make some automated corrections inside MS Word by running macros. The example would be the hard-space, that is inserted automatically after some one character prepositions and conjunctions (in Czech), however MS Word does not apply all the typographic rules and completely ignores the fact that the non-breaking space should follow “o”, “i”, “a”, triple figures, figure when the unit follows etc. Replace function using regular expressions may be applied. The following table (Table 16) describes ways how to replace such strings.

There are of course more problems regarding spaces than just line broken at the improper place. Many times students are either unaware or typing error-prone, and the improper space occurrences may be automatically treated in some cases, as the table further describes.

Table 16. Replace table for treating errors regarding spaces

<i>Search string</i>	<i>Replace with</i>	<i>Bad example (Czech)</i>
<i>hard space instead of regular (expandable) space</i>		
o(space), a(space), i(space)...	o(hard-space), a(hard-space), i(hard-space)...	a tento text není v podstate o ničem podstatném
([0-9]{1-3}) ([0-9]{3})	\1^s2	dnes se mi zdál zvláštní sen o 3 333 stříbrných stříkačkách
([0-9])(space)Kč	\1^sKč	v obchodě jsem zaplatil o 3 984 Kč víc, než jsem musel
([0-9])(space)cm/m/kg/m ² ...	\1^scm/m/kg/m ² ...	
Ing.(space), Dr.(space), PhDr.(space)...	Ing.^s, Dr.^s, PhDr.^s)...	dobry den preji, jmenuji se Ing. Eva Mikulčíková
<i>extra space</i>		
“)	“)	tak tomu říkám škodolibost
(„	(„	(„Schadefreude”)
. ,	.,	3 498. , 1 385. , 852.
+ ([0-9]{1})°C	+([0-9]{1})°C	+ 3 °C
(space)(space)	(space)	používat mezeru místo tabulátoru není správné

It is of course, possible to do these corrections manually with the use of Replace dialog window. The next alternative to macros is to use automated corrections during the typing. MS Word offers more than just a regular space character and a hard-space. Under Insert – Symbol – Special characters a user may find another 3 kinds of spaces:

- wide space,
- narrow space,
- $\frac{1}{4}$ (em?) space.

Those are spaces with constant widths however, they may be broken at the end of the line, what makes them less usable (especially $\frac{1}{4}$ em non-breakable space would be perfect for typesetting numbers followed by unit names). OpenOffice.org only knows one type of hard-space, so one should avoid using other spaces in MS Word, if he/she intend to use Writer2 $\text{\LaTeX}$ to convert it to the $\text{\LaTeX}$ document.

How to improve MS Word output:

	<i>search</i>	<i>replace with</i>
ligature	fi; fl	fi; fl (where appropriate, not everywhere)
multiple tabulators	(tab)(tab)	(tab)
/./	(.)	these should be removed manually
...	...	
" (inch)	“, ”or „	replace with care

This set of sample documents used in the previous section will be examined to give a reader more reason for realization of such macros.

<i>No.</i>	<i>Pg</i>	<i>Chars</i>	<i>Empty paragraphs</i>	<i>Unnecessary spaces</i>	<i>Unnecessary tabulators</i>	<i>„” as ”” or “”</i>	<i>(sp¹⁰ sp) sp sp: sp</i>
1	91	129 342	187	1315	35	2	3
2	85	148 135	41	488	3	3	1
3	68	120 483	34	207	-	-	-
4	81	91 920	35	49	10	1	8
5	121	178 923	270	3703	-	4	43
6	88	111 992	202	82	175	-	1
7	65	85 749	19	23	-	-	-
8	56	70 823	43	27	-	1	6
9	94	119 260	3	19	-	2	4
10	76	114 718	6	47	-	4	3

The results indicate that one third of students under examination use paragraphs excessively – in well formatted work they are expected to appear very infrequently (< 10 occurrences for the comparably long work).

Every work was significantly overwhelmed by the double-spaces, those are really sometimes really hard to spot when doing the visual validation of the text. They however effect disturbing if appear in a printed sheet.

One work was heavily “garbaged” by the double-tabulators, where combination of one tabulator and tabulator mark would be sufficient. The amount of other typographic typos varied from 0 to 48 (the mean value was 8,6 typos/document).

¹⁰ sp (here) = space

8 ADMINMOST ANALYSIS

During the time we watch the writer we may observe some repetitious actions. These actions may be measured and then optimized. In the following text I will introduce a reader to the findings I came to during my observations.

According to the survey, almost one half of students prefers manual paragraph formatting to using styles. Let's do a simple comparison using AdminMOST analysis of these tasks. In all cases we start from the basic position on the keyboard where forefingers lay or F and J keys (the basic position). The task is to generate the following document structure:

- 7 first level sections,
- 20 second level subsections,
- 54 third level subsubsections.

The sections are formatted this way:

- Section: Times New Roman 14, CAPS, **Bold**.
- Subsection: Times New Roman 14, Normal.
- Subsubsection: Times New Roman 12, **Bold**.

It is expected for writer to write at least one text paragraph after the section however this time will not be the part of the analysis. Also, to simplify the analysis, the T (Think) factor (to read the previous section number and increase by one) will be excluded. The analysis for the writer (not using styles) follows:

Table 17. AdminMOST – section formatting (manually)

<i>Operation</i>	<i>Model</i>	<i>TMU</i>
grab mouse and click Font size on the toolbar	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ W ₁ A ₀ B ₀ P ₀ A ₀	30
slide mouse to 14 and click	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ W ₁ A ₀ B ₀ P ₀ A ₀	10
move mouse pointer to B (bold), click, return hand on the keyboard	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ W ₁ A ₀ B ₀ P ₀ A ₁	20
type digit = section number followed by space, CAPS-LOCK, (section title), Enter, CAPS-LOCK	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ W ₃ A ₀ B ₀ P ₀ A ₀	30
grab mouse and click Font size on the toolbar	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ W ₁ A ₀ B ₀ P ₀ A ₀	30
slide mouse to 12 and click	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ W ₁ A ₀ B ₀ P ₀ A ₀	10
move mouse pointer to B (bold), click, return hand on the keyboard	A ₀ B ₀ G ₀ A ₀ B ₀ P ₁ W ₁ A ₀ B ₀ P ₀ A ₁	30

<i>Operation</i>	<i>Model</i>	<i>TMU</i>
Total TMU		160

In the following case we presume that the user is using template with predefined styles for each section and with the keyboard shortcut assigned to each style:

Table 18. AdminMOST – section formatting (using styles)

<i>Operation</i>	<i>Model</i>	<i>TMU</i>
type Ctrl+1 to set section paragraph style	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ W ₁ A ₀ B ₀ P ₀ A ₀	10
(section title)		-
hit Enter	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ W ₁ A ₀ B ₀ P ₀ A ₀	10
Total TMU		20

Similarly for the subsection done manually:

Table 19. AdminMOST – subsection formatting (manually)

<i>Operation</i>	<i>Model</i>	<i>TMU</i>
grab mouse and click Font size on the toolbar	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ W ₁ A ₀ B ₀ P ₀ A ₀	30
slide mouse to 14 and click, return hand on the keyboard	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ W ₁ A ₀ B ₀ P ₀ A ₁	20
type 3 digits (1.1), followed by space, (section title), Enter	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ W ₃ A ₀ B ₀ P ₀ A ₀	30
grab mouse and click Font size on the toolbar	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ W ₁ A ₀ B ₀ P ₀ A ₀	30
slide mouse to 12 and click, return hand on the keyboard	A ₀ B ₀ G ₀ A ₀ B ₀ P ₁ W ₁ A ₀ B ₀ P ₀ A ₁	20
Total TMU		130

Using the styles and keyboard shortcuts:

Table 20. AdminMOST – subsection formatting (using styles)

<i>Operation</i>	<i>Model</i>	<i>TMU</i>
type Ctrl+2 to set subsection paragraph style	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ W ₁ A ₀ B ₀ P ₀ A ₀	10
(section title)		-
hit Enter	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ W ₁ A ₀ B ₀ P ₀ A ₀	10
Total TMU		20

And for the subsubsection at last (manually):

Table 21. AdminMOST – subsubsection formatting (manually)

<i>Operation</i>	<i>Model</i>	<i>TMU</i>
grab mouse, slide mouse cursor to B (Bold) and click, return hand on the keyboard	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ W ₁ A ₀ B ₀ P ₀ A ₁	40
type 5 digits (1.1.1), followed by space, (section title), Enter	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ W ₃ A ₀ B ₀ P ₀ A ₀	30
grab mouse, slide mouse cursor to B (Bold) and click, return hand on the keyboard	A ₀ B ₀ G ₀ A ₁ B ₀ P ₁ W ₁ A ₀ B ₀ P ₀ A ₁ P ₁	50
Total TMU		120

Using styles:

Table 22. AdminMOST – subsubsection formatting (using styles)

<i>Operation</i>	<i>Model</i>	<i>TMU</i>
type Ctrl+3 to set subsubsection paragraph style (section title)	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ W ₁ A ₀ B ₀ P ₀ A ₀	10
hit Enter	A ₀ B ₀ G ₀ A ₀ B ₀ P ₀ W ₁ A ₀ B ₀ P ₀ A ₀	10
Total TMU		20

Table 23 compares the TMU values of the two styles of formatting.

Table 23. AdminMOST – comparison (TMU)

	<i>Manual (TMU)</i>	<i>Styles (TMU)</i>	<i>Efficiency Ratio</i>
section	160	20	8×
subsection	130	20	6,5×
subsubsection	120	20	6×

The next table (Table 24) presents the actual time saved for the defined document structure. (1 TMU is 0,036 second)

Table 24. AdminMOST – comparison (Total time)

	<i>Manual (sec.)</i>	<i>Styles (sec.)</i>	<i>Difference (saved time)</i>
7× section	40,3	5	35,3
20× subsection	93,6	14,4	79,2
54× subsubsection	233,28	38,8	194,48
Total time (s)	367,18	58,2	309

The total saved time is more than 5 minutes. This is however not the only benefit of using styles for headings. Note that creating a table of contents would take considerable amount

of time in case the manual section formatting is used. A rather simplified computation is shown in Table 25.

Table 25. AdminMOST – Table of contents

<i>Operation</i>	<i>Model</i>	<i>TMU</i>
grab mouse, click the slider, slide mouse cursor to the (sub)section	$A_0B_0G_0A_1B_0P_1W_3A_0B_0P_0A_0$	50
click at the section title beginning to start mouse selection, move mouse cursor at the end of the section title, release mouse	$A_0B_0G_0A_0B_0P_0W_1A_0B_0P_0A_0$	10
press Ctrl+C with the left hand	$A_0B_0G_0A_0B_0P_0W_1A_0B_0P_0A_0$	10
read page number	T_1	10
click the slider, slide mouse cursor back to the table of contents, click	$A_0B_0G_0A_0B_0P_0W_3A_0B_0P_0A_0$	30
press Ctrl+V with the left hand, return hand from mouse to the keyboard	$A_0B_0G_0A_0B_0P_1W_0A_0B_0P_0A_1$	30
press Tab key followed by the page number (left hand), Enter	$A_0B_0G_0A_0B_0P_0W_1A_0B_0P_0A_0$	10
Total TMU		140
× section count		81
		11 350
<i>Operation</i>	<i>Model</i>	<i>TMU</i>
right-click on the existing (generated) table of contents, update	$A_0B_0G_0A_1B_0P_1W_1A_0B_0P_0A_0$	30
Difference (TMU)		11 320

The difference makes 11 310 TMU, that is 407 seconds. Please note, that you often need to generate the table of contents during the process of writing, not only at the end, before the printing. While using the manual formatting it would need repetitious validation and correction of existing/missing entries in the table of contents, if you use styles, you can update the whole table of contents using two mouse clicks. The similar procedure applies to the list of figures and list of tables, which is de facto a table of contents with one level depth.

Please note this: keyboard to mouse movement with single or doubleclick, then back to keyboard “costs” you 50 TMU (A_1 – keyboard to mouse movement, P_1 – positioning hand on mouse, W_1 – mouse cursor movement and click, A_1 – back to keyboard movement, P_1 –

placement hand on the keyboard), while assigned shortcut only costs 10 TMU (W_1 – type 1–2 figures). That is 400% difference. If you find yourself operating mouse too much, consider creating macros and assigning keyboard shortcuts to them. This may save you remarkable amounts of time.

If you are not good at remembering the defined shortcuts, add the most frequent functions on the toolbar. This is an example to bring up Insert crossreference dialog window (OpenOffice). Using menu – 40 TMU: A_1 – keyboard to mouse movement, P_1 – positioning hand on mouse, W_1 – mouse cursor to Insert and click, W_1 – mouse cursor to Cross-reference and click. With toolbar icon – 30 TMU: A_1 – keyboard to mouse movement, P_1 – positioning hand on mouse, W_1 – mouse cursor to Insert and click. And at last, using the keyboard – 10 TMU (W_1 – shortcut pressed).

III. PROJECT

9 THE PROJECT SUMMARY

This is a brief overview of the project. The people responsible if not stated explicitly in the text are: Bc. Jozef Riha and Ing. Pavel Striz.

Feb 2004	dealing with the University chancellor about the situation regarding thesis document templates
Dec 2004	the first version of MS Word template for all three faculties (based on the design manual)
Jan 2005	the second version of MS Word template containing the bibliography citations (based on ISO 690) as requested by the Rectorate
Feb – March 2005	communication with the library staff about their requirements for the theses comments and verifications by Mr. Illik from the Faculty of Multimedia Communications comments and verifications by the Rectorate (doc. Prokop, Mrs. Zahorovska)
March 2005	first version of OpenOffice.org Writer template
Apr 2005	website sablon.kvalitne.cz launched, shortly after Questions (Dotazy) sections established – more than 50 questions answered stable version of OOo Writer template – published at Univ. website (App. 5) the survey taken
June – July 2005	corrections to the existing Word and OOo Writer templates respecting the requirements of the students and the University template for $\text{\LaTeX}$ publishing of all templates – with comments, empty, native format + pdf
July – Sept 2005	update of this thesis and my bachelor thesis according to the latest template and publishing both at the Univ. pages reorganization of the sablon.kvalitne.cz – sorting the questions/answers section into separate topics macros for MS Word, OpenOffice.org

first half of 2006	template for OpenOffice.org 2.0 (depends on the actual situation with this OpenOffice.org version) template for MS Word XP – according to the survey, more than ¾ of students use this (or newer) version of MS Office issue a template manual based on the collected students' questions templates translation to English
2nd half of 2006	the discussion of project of the automated bibliography citation based on the University Library database starts

The project of theses templates creation was welcomed by the Rectorate mainly because of these reasons:

- the transformation to the system of electronic theses submission (STAG) that allows external authorities to download and view allowed theses,
- the look of the theses coming from all three Faculties should be unified,
- the University library was calling for paperworks that would be written in more professional manner (correct citations, structure, appurtenances)

The project of automated bibliography citations was a failure. The intention was to create a database containing all the sources in the University library, so the students would not have to:

- know the ISO 690 and ISO 690-2 standards heart,
- rewrite these information from the back of the publications.

The project however failed on the fact that the internal database used by the library does not have the items sorted in the way allowing to create valid and full bibliography references. Another try was to use CNB (The Czech National Bibliography) database but unfortunately, the situation was the same. An attempt to create an independent bibliography database was made by Ms. Farkasova and Mr. Krcal. The project pages¹¹ contains a database that can be searched for existing bibliography entries or a generator may be used to create an item conforming to ISO 690 standard.

The experience showed that MS Word lacks user friendly way to cite bibliography resource throughout the document. The solution has been found using the title named “[“ and cross-references. OpenOffice.org Writer's module is better prepared for the work with

¹¹ Projekt Bibliografické citace, available online at <http://www.citace.com>

bibliography (external database) however a few crucial points have been revealed indicating that OpenOffice.org really need a better system for handling the bibliography.

9.1 The WWW Pages

The webpage <http://sablona.kvalitne.cz> (screenshot: Figure 19) was born as a humble supportive project to inform students about the existence of new template, some techniques that can make the writing more pleasant and also to give them questions to various answers regarding the thesis. The webpage was entitled as “unofficial” so to indicate that it was not affiliated with the University authorities. Despite this fact, the pages were quickly accepted not only by the students but I also detected few cases of thesis mentors referring to them.

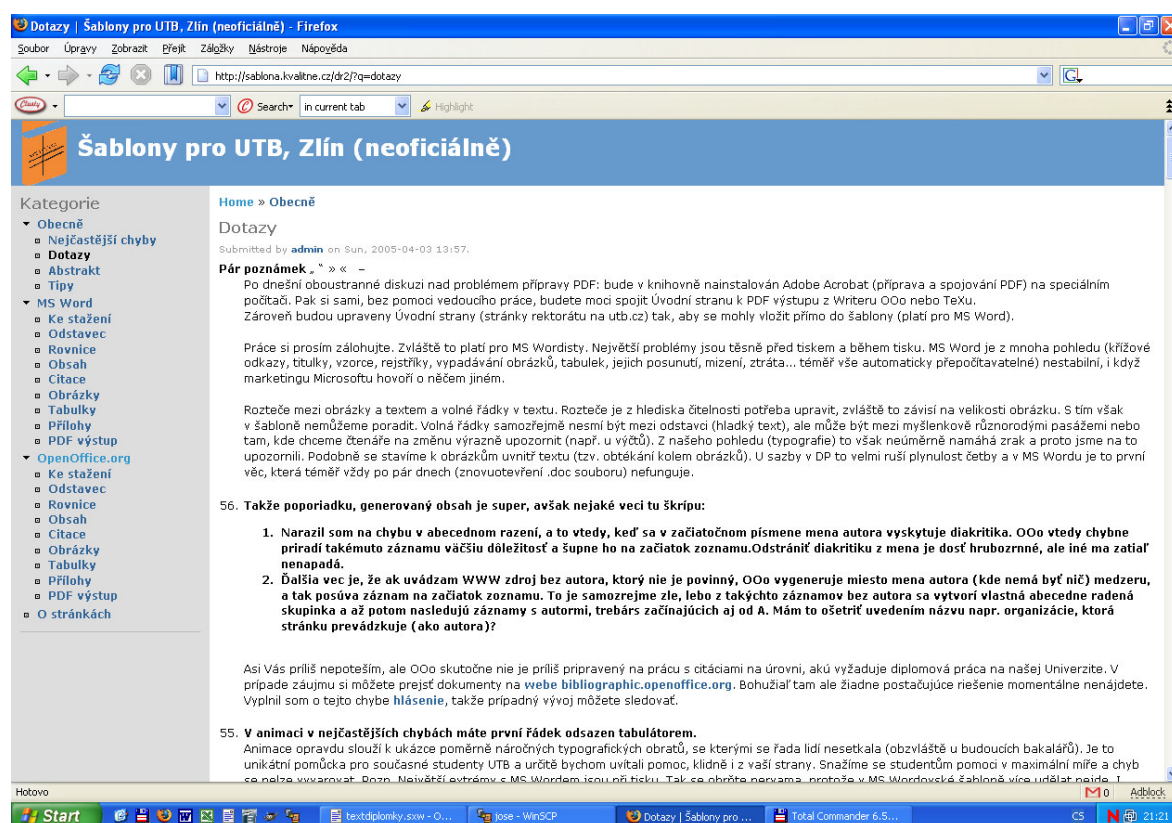


Figure 19. Website sablona.kvalitne.cz – screenshot

The site was created using the open source content management platform Drupal¹² and it was placed on a free webhosting server www.webzdarma.cz. Due to the fact that some students explained about the pages unaccessability, some portions of the site were moved to the server at the University (running 24/7).

¹² Drupal CMS, available online at <http://www.drupal.org/>

9.2 Macros

The set of macros for finding and removing the typographic errors will be added to the templates. However, the old (non-macro) version will be retained because of the fact that some students do not want to risk the potential dangerous of infecting their PCs via macro viruses that may leak among the existing macros.

The macro will be assigned a specified shortcut and after the execution it will automatically find and correct the typos. Uncertain errors (such as parenthesis and slashes mismatch) will be highlighted, to tell user know about the potential problem. The changes will be automatically saved into a new document based on the old filename and -changed keyword so that the original document will stay unchanged in case of the emergency.

CONCLUSION

The work showed that though MS Word is as a master DTP system used widely in our academic area for writing theses, many students experience problems using it. The survey revealed that more than half of the students do not know the techniques that may help them improve their writing experience. These include tasks such as creating automatic tables of contents, references to tables, figures, using paragraph styles and similar. The work brought some possible solutions on how to avoid problems during the writing, as well as some improvements that could be made to the created template(s) for making this process smoother.

I heard a friend of mine complaining about the problem he was having with the figures in his document. They were floating all over the page, just not at the places where he wanted them to be so he had to fix them every time he did some changes. I took a look at that and taught him how to correctly anchor the figures on the page. Since that time he never had a problem with that. Note that the most of the students (I asked) hadn't heard about the anchor.

It is not possible to mention all the experience and findings I acquired during the project phase, however I will certainly use them for the following work – especially for creating an updated writing manual, possibly as a part of the lessons for the 1st year students.

The reality shows that students coming from high schools and colleges do not have the expected skills to easily manage the DTP software of their choice. There is a need to explain to some students that the most obvious solution (e. g. copy and paste images from a graphic viewing software to MS Word) is not necessarily the best one (this will produce huge Word documents and during the saving – it may take several minutes – the computer won't be responding to the keyboard or mouse input).

The project was a hugely beneficial, on the technical side (I've learned many things about how the specific program works, revealed various bugs in the programs and found the way how to work-round them) but also by the social interactions. It was very interesting to watch my co-students reactions to the changes that were happening. According to the survey results however it seems that most students were satisfied by the template.

Near the completion of this work I found out that students at many foreign universities use LyX program – the graphical frontend to the L^AT_EX system and many universities provide a template for this program as well. My suggestion is to make an experiment to find out how well would our students would be able to cope with this program.

According to the AdminMOST analysis it is possible to format paragraphs at least $6 - 8 \times$ faster than manually. Moreover the user using styles instead of individual paragraph formatting will be able to generate the table of contents $377 \times$ faster than the user creating the table of contents “by hand.”

The results brought in the project part of this work will be used for the preparation and writing of a manual that will address all detected and documented problems the students encountered during their theses writing.

The impact of created templates are:

- University credit raise – not every university has created the templates that may be used by its students, this would also increase University recognition,
- unified look of the produced theses – to a certain extent. It is unwanted in most cases to have every document looking different. Thanks to the templates it is likely that the user would create a document based on the criteria set by the University.
- the students will be able to write the thesis right-away, they would not have to spend time with the preparation of the document – margins, styles, header etc.
- the students will come to know various aspects of the Word/OpenOffice.org Writer their limitations. Thus they will be aware of possible problems and ways how to avoid them.
- Ensuring and enforcing correct bibliography citations adhering ISO 690 standard.

The complexity of the studied subject could not be covered by the limited scope of this work however I believe that it will be used as a good starting point for institutions considering template creation, its application and the improvement of its efficiency.

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RECOMMENDED RESOURCES

ČSN ISO 690 (01 0197). Bibliografické citace: Obsah, forma a struktura.

ČSN ISO 690-2 (01 0197). Bibliografické citace. Část 2: Elektronické dokumenty nebo jejich části

ČSN 01 0195. Bibliografický záznam.

ČSN ISO 214. Dokumentace – Abstrakty pro publikace a dokumentaci

ČSN ISO 7144 (01 0161). Formální úprava disertací a podobných dokumentů.

ČSN ISO 5966 (01 0173). Formální úprava vědeckých a technických zpráv.

ČSN 01 0194. Referát a anotace.

ČSN 01 6910. Úprava písemností psaných strojem nebo zpracovaných textovými editory

ČSN 01 0196. Zkracování názvů časopisů a jiných periodik.

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LIST OF ABBREVIATIONS

DTP	Desktop Publishing
DVI	Device-Independent
EPS	Encapsulated Postscript
GDI	Graphics Device Interface
GIF	Graphic Interchange Format
GUI	Graphical User Interface
JPEG	Graphics file type/extension (lossy compressed 24 bit color image storage format developed by the Joint Photographic Experts Group)
MOST	Maynard Operation Sequence Technique
OOo	OpenOffice.org
PDF	Portable Document Format
PNG	Portable Network Graphics
PS	Postscript
TBU	Tomas Bata University
TMU	Time Measurement Unit (equals to 0.036 s)
WWW	World Wide Web
WYSIWYG	What You See Is What You Get

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APPENDICES

APPENDIX P 1: LaTeX page layout

APPENDIX P 2: OpenOffice Writer page layout

APPENDIX P 3: MS Word page layout

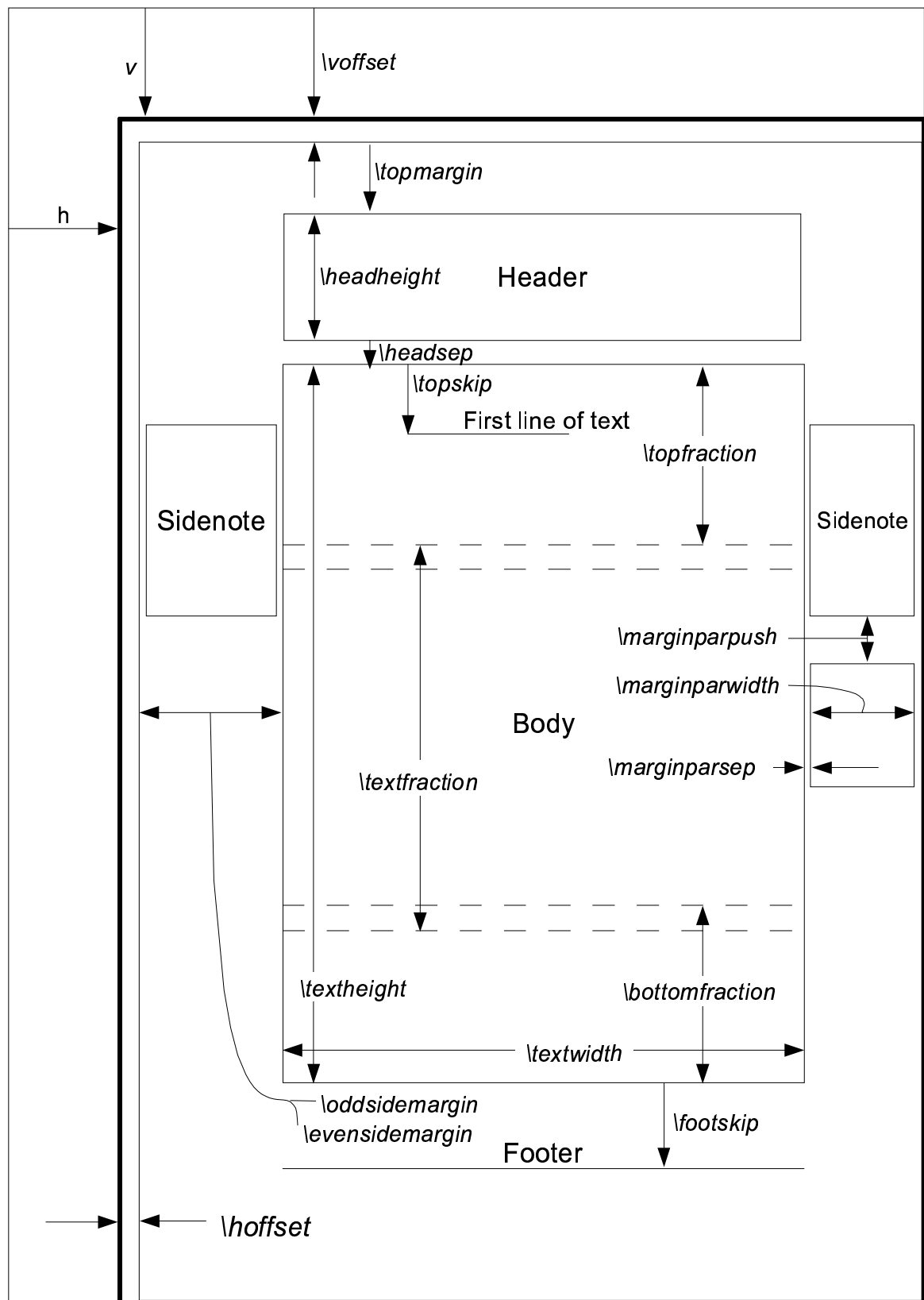
APPENDIX P 4: Vocabulary – abstract

APPENDIX P 5: Templates – published at the University website (screenshot)

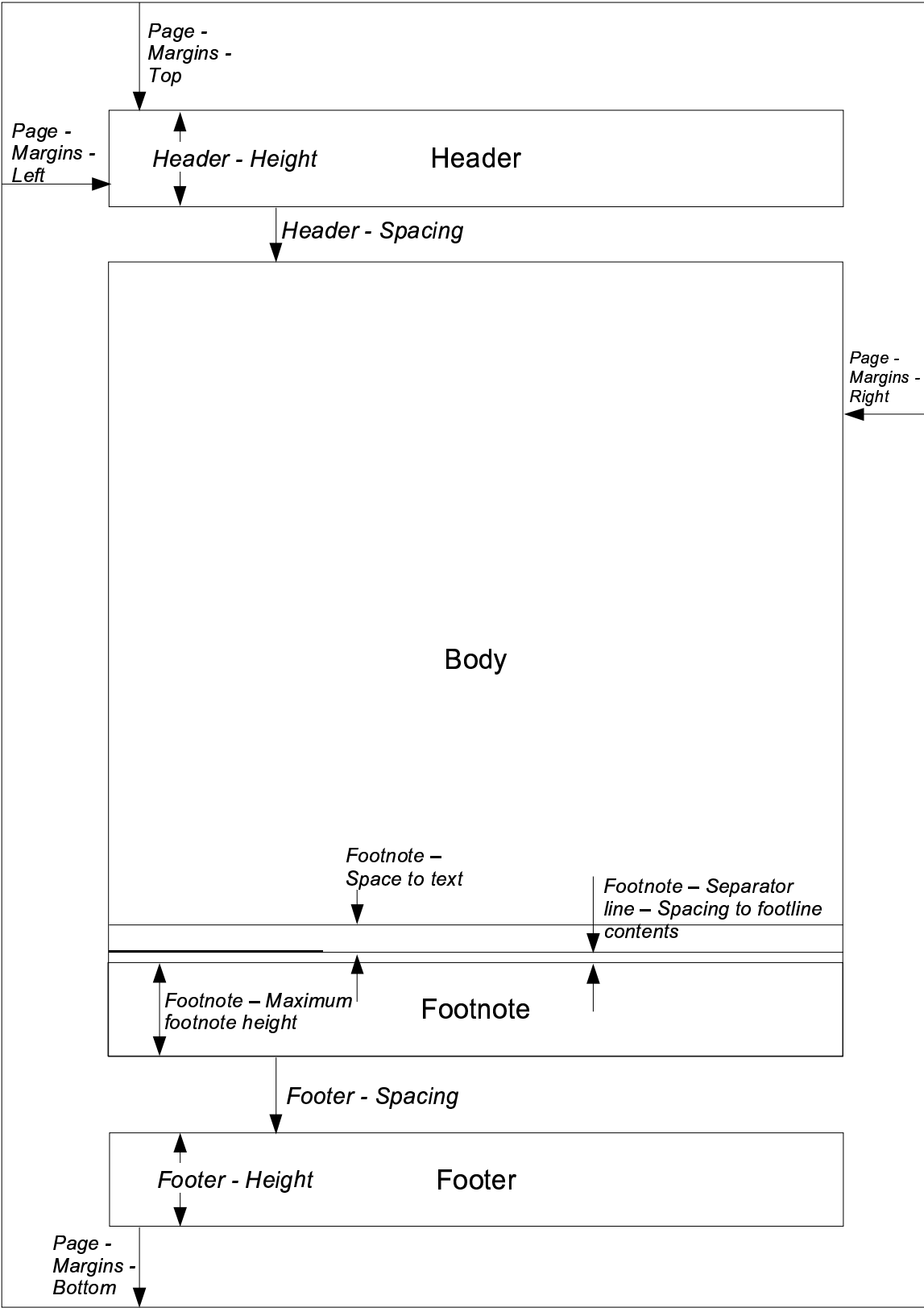
APPENDIX P 6: Software used to create this work

APPENDIX P 7: CD-ROM

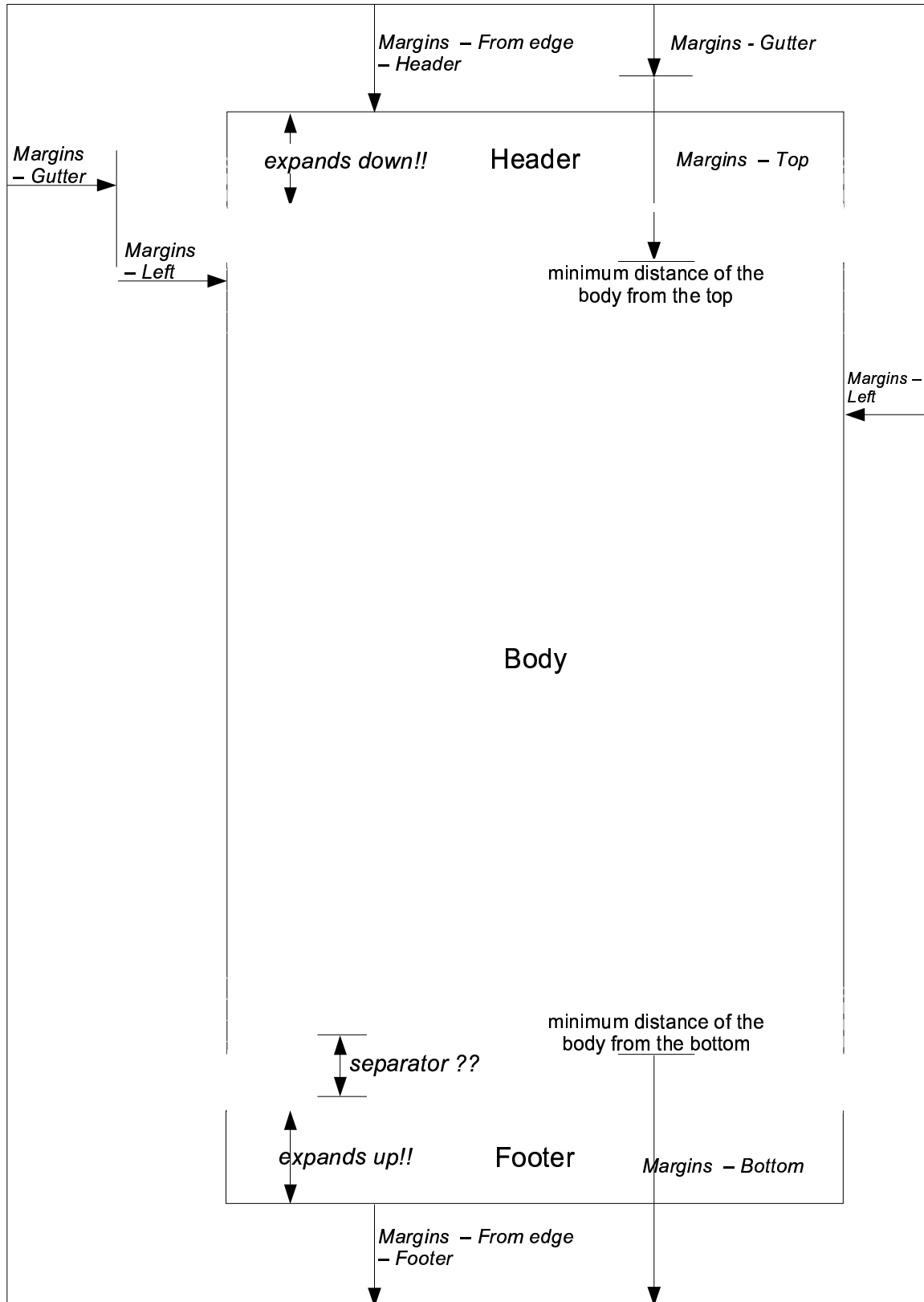
APPENDIX P 1: LATEX PAGE LAYOUT



APPENDIX P 2: OPENOFFICE WRITER PAGE LAYOUT



APPENDIX P 3: MS WORD PAGE LAYOUT



APPENDIX P 4: VOCABULARY – ABSTRACT

en	de	fr	cz
the bachelor thesis	Bachelor-Arbeit, Bachelor-Abschlussarbeit	licence	bakalářská dipl. práce
the master thesis	die Master-Arbeit, Master-Abschlussarbeit	thèse/mémoire de master	diplomová práce
thesis mentor		• encadrant • co-encadrant	vedoucí práce
• the master thesis discusses • is a discussion of • deals with	• die Master-Arbeit behandelt • ist eine Abhandlung von • handelt von/über	• ce mémoire de master parle de • ce mémoire de master traite de • est une explication de • est une discussion sur	• diplomová práce se zabývá • diplomová práce rozebírá • diskutuje o
the main part of this work documents...	der Hauptteil dieser Arbeit dokumentiert den...	• l'essentiel de ce travail décrit • ce travail décrit essentiellement	hlavní část této práce dokumentuje
in the XYZ chapter the ... is/are the focus of attention	in XYZ. Kapitel stehen die ... im Mittelpunkt	dans le chapitre XYZ, nous nous concentrons sur	v kapitole XYZ je věnována pozornost
• the goal of this paper work is to • the key objectives of the thesis are	• Ziel der Arbeit ist • die wichtigsten Ziele der Arbeit sind	le but de ce travail est	• cílem této práce je • klíčovými body této práce jsou
the thesis consists of these 3 main parts	die Arbeit besteht aus 3 Teilen	ce mémoire est séparé en trois (grandes) parties	práce se skládá z těchto 3 hlavních částí
the results will be applicable to	Das Resultat kann auf ... angewandt (angewendet) werden	les résultats seront utilisable pour	výsledky budou použity pro
the focus of my paper	die Intention dieser Arbeit war es	l'objet de mon papier	zaměření mé práce

I start from the theoretical basis	Ich beginne mit dem theoretischen Standpunkt	je commencerai par exposer les bases théoriques	vycházím z teoretického základu
I built my solution on the practical part includes	Ich basiere meine Lösung auf der praktische Teil enthält	ma solution est basée sur les applications comprennent	při řešení vycházím z praktická část zahrnuje
it was found that	• es wurde herausgefunden, dass • ... was erfasst	il a été montré que	bylo zjištěno, že
this work presents	diese Arbeit stellt ... dar	ce travail présente	tato práce prezentuje/představuje
the effect of ... is studied	der Effekt von ... wurde untersucht	• l'effet de ... est étudié • nous étudions l'effet de...	účinek ... je zkoumán
a separate test is done using a...	ein eigener/separater Test wird mit ... gemacht	un essai séparé est fait en utilisant un...	je proveden samostatný test za použití.
Bibliography lists 6 sources.	Die Bibliographie nennt/enthält 6 Quellen.	La bibliographie contient 6 références.	Bylo citováno 6 zdrojů.
the writer/paper examines...	Autor/Papier untersucht...	l'auteur(e)/le papier examine...	autor/práce zkoumá...
he/she makes it clear that...	er/sie macht klar, dass	il/elle indique clairement que...	objasňuje
the writer argues...	der Schreiber argumentiert...	l'auteur(e) argumente/discute	autor argumentuje...
the paper provides an overview of...	das Schriftstück stellt einen Überblick über ... zur Verfügung	l'article fournit une vue d'ensemble de...	práce poskytuje přehled o...
thesis, paper work, paper, work	These, Arbeit, Büroarbeit, Artikel	travail, étude	práce
the theory of ... predicts	die Theorie von/über ... sagt vorher	la théorie de ... prévoit	teorie ... tvrdí

the paper compares and contrasts...	• der Artikel vergleicht uns versucht die Unterschiede herzustellen • der Artikel vergleicht (und stellt die Kontraste heraus...)	l'article compare et oppose	práce srovnává
the paper clearly indicates	der Artikel deutet klar darauf hin	ce mémoire montre clairement	práce jasně naznačuje

APPENDIX P 5: TEMPLATES – PUBLISHED AT THE UNIVERSITY WEBSITE (SCREENSHOT)

[MAPA STRÁNEK](#)
[RYCHLEJŠÍ VERZE](#)
[ENGLISH VERSION](#)


Univerzita Tomáše Bati ve Zlíně

O univerzitě	Pozdrav rektora		
Aktuality	Profil univerzity		
Organizační členění	Kontakty		
Zvolte si UTB	Úřední deska		Zákony
Přijetí na UTB	Orgány univerzity		Vnitřní předpisy
Studium	Symboly a loga		Rozhodnutí rektora
Tvůrčí činnosti	Univerzita v číslech		Směrnice rektora
Mezinárodní vztahy	Události		Směrnice kvestora
Studentský život	Historie		Pokyny kvestora
Interní informace	Dislokace		Výroční zprávy
Kongresové centrum	Investiční rozvoj	Dlouhodobý záměr	
UTB a media	Nabídka zaměstnání	Kolektivní smlouva	
Vyhledávání	Časopis, brožura		




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 info@utb.cz

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- **Příloha č. 1A_1** [157 KIB]  - Šablona pro Microsoft Word
- **Příloha č. 1A_2** [301 KIB]  - Šablona pro Microsoft Word (její PDF obraz)
- **Příloha č. 1A_3** [58 KIB]  - Šablona pro Microsoft Word (prázdná)
- **Příloha č. 1A_4** [29 KIB] - Šablona pro Writer OpenOffice.org
- **Příloha č. 1A_5** [216 KIB]  - Šablona pro Writer OpenOffice.org (její PDF obraz)
- **Příloha č. 1B** [62 KIB]  - Anglická terminologie
- **Příloha č. 2** [50 KIB]  - Licenční smlouva o podmínkách užití díla

APPENDIX P 6: SOFTWARE USED TO CREATE THIS WORK

<i>Software</i>	<i>Description of use</i>
Drupal 4.6.0	PHP Content management system used for sablona.kvalitne.cz
Firefox 1.0.3	screenshots (P 5)
GhostScript 7.0.7, epstool 3.0.7	handling EPS images
Gimp 2.2.6 for win32	screenshots editing
Kile	GUI frontend for KDE to LaTeX
MS Excel 2000	ANOVA computation, charts
MS Word 2000	examples
OpenOffice.org 1.1.4	typesetting of this work
OpenOffice.org 2.0beta	appendices P1 – P3
rtf2LaTeX2e	testing: Word2TeX conversion
T-602	examples (Figure 3, Figure 6)
TeX Live 2004	LaTeX examples
VMWare 5.0.0	used to run Windows and its applications
Word2TeX 3.0 (evaluation)	testing: Word2TeX conversion
Writer2LaTeX 0.4b2	testing: Word2TeX conversion
x11vnc, vnc2swf	flash animations at the sablona.kvalitne.cz website