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DEPARTMENT OF COMPUTER GRAPHICS AND MULTIMEDIA
ÚSTAV POČÍTAČOVÉ GRAFIKY A MULTIMÉDIÍ

BUSINESS CARDS GENERATOR
GENERÁTOR VIZITEK

BACHELOR'S THESIS
BAKALÁŘSKÁ PRÁCE

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Bachelor's Thesis Specification

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Student: **Chytilová Kristýna**
Programme: Information Technology
Title: **Business Cards Generator**
Category: Computer Graphics
Assignment:

1. Perform an overview of typographic guidelines related to business card design.
2. Create an Internet based business card generator application according to supervisor's instructions.
3. Perform testing and evaluation.
4. Provide suggestions for future work.

Recommended literature:

- Specified by supervisor

Requirements for the first semester:

- Item 1 and partially item 2.

Detailed formal requirements can be found at http://www.fit.vutbr.cz/info/szz/

Supervisor: **Chudý Peter, doc. Ing., Ph.D. MBA**
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Abstract

Business cards are still frequently used to share personal or company information. This bachelor thesis deals with development of a web based application for generating business cards. The user can personalize the business card or he/she may choose from a range of modern templates. Export option allows for saving the business card layout into a PDF file, which is meant for sharing and printing.

Abstrakt

Vizitky jsou stále populární způsob jak předat své nebo firemní informace druhé osobě. Tato práce se zabývá vytvořením webového programu pro tvorbu vizitek. Uživatel si může vizitku zcela zpersonalizovat nebo si vybrat z předem vytvořených šablon. Následně si může nechat vizitku vyexportovat do formátu PDF, který je určen pro sdílení nebo tisk.

Keywords

Business card, rules of typography, color theory, psychology of colors, web application, templates, generator, user interface.

Klíčová slova

Vizitka, typografická pravidla, teorie barev, psychologie barev, webová aplikace, šablony, generátor, uživatelské rozhraní.

Reference

Rozšířený abstrakt

Vizitky jsou stále populární způsob jak předat své základní údaje druhé osobě. Tvorba vizitky se řídí určitými pravidly, a ne každý člověk má dostatečné zkušenosti a dovednosti aby tvorbu zvládnul sám. Pokud někdo potřebuje vizitku vytvořit, tak se mu nabízí hned několik možností:

- Objednat si vizitku u grafika.

- Vizitku si vytvořit v nějakém grafickém programu nebo webové aplikaci.

- Vizitku si vytvořit v programu nebo aplikaci zaměřeném přímo na vizitky.

Všechny tyto možnosti mají své pro a proti. Tato práce se zaměřuje na vytvoření webové stránky pro tvorbu vizitek, která bude obsahovat hned několik funkcí, které nejsou v dostupných nástrojů pro tvorbu vizitek běžné.

Bylo nutné nastudovat typografická pravidla, teorii barev a tvarů a jiné náležitosti nutné pro tvorbu vizitek, jako je třeba jejich velikost a obsah.

Aplikace je postavená na jiných nástrojích pro tvorbu vizitek. Po vytvoření SWOT analýzy z těchto nástrojů vzniklo několik bodů, které ve většině zkoumaných nástrojů chyběly, a které by měla navrhovaná aplikace nabízet:

- Výběr z šablon, které jdou zpersonalizovat – zkoumané aplikace nabízeli velké množství šablon, které v drtivé většině případů nešli upravit. To znamenalo, že pokud se uživateli něco nelíbilo, tak si musel vybrat jinou šablonu. Většinou bylo možné upravit text, ale pozadí vizitky bylo neměnné.

- Export PDF souboru s ořezovými značkami – možnost si práci vyexportovat s více jak 1 vizitkou a ořezovými značkami nenabízela skoro žádná aplikace.

- Itemy na vizitce půjdou dát do pozadí nebo do popředí – pokud aplikace nabízela přidání itemů na vizitku (text, obrázek), tak s přidaným itemem nešlo manipulovat na Z ose. To znamenalo, že si uživatel musel dopředu rozmyslet, jestli chce například přidaný obrázek na pozadí nebo ne.

- Nahrávání obrázků a různých tvarů – některé aplikace umožňovali nahrání obrázku. Nahrání různých tvarů (obdélník, čtverec, kruh), bylo velice ojedinělé.

- Neomezené množství textových itemů – protože většina aplikací měla šablony, které nešli upravit, tak chyběla i možnost přidat na vizitku další text.

Na základě těchto požadavků byla vytvořena webová aplikace Business Cards Creator. Aplikace je naprogramovaná v jazycích HTML a JavaScript a využívá CSS pro vytvoření grafického rozhraní. Pro posouvání itemů po vizitce, pro změnu velikostí obrázků a tvarů, pro výběr fontu a barev a pro export PDF formátu s hotovou vizitkou, byly využity dostupné JavaScript knihovny.

Aby bylo potvrzené, že je aplikace funkční a intuitivní, byla provedena řada testů. Důležité testování byl test kompatibility a testování použitelnosti. Testy kompatibility proběhli na 3 nejčastěji používaných webových prohlížečích: Mozilla Firefox, Google Chrome a Opera. Na všech prohlížečích je aplikace funkční. Testování použitelnosti bylo provedeno za pomocí 30 uživatelů, kteří dostali několik úkolů, které museli splnit. Následně vyplnili dotazník. Zpětná vazba od těchto uživatelů bylo zahrnuta do aplikace. Jednalo se především o změnu tlačítek, které byli pro uživatele nejasné před tím, než je použili. Dále se

změnil způsob zadávání textu do textových boxů. Pokud chtěl uživatel změnit text, musel kliknout na daný textový box. Následně se kurzor myši objevil na začátku boxu. Tohle znamenalo, že uživatel musel pro smazání aktuálního obsahu boxu buď použít tlačítko 'Delete' anebo musel kliknout znovu, a to na konec textového boxu, aby se tam přesunul i kurzor. Nový způsob změny textu již nastavuje kurzor automaticky za poslední znak v textovém boxu.

Konečná aplikace nabízí výběr několika moderních šablon, úprava fontu (změna rodiny fontu, velikosti a barvy, italic, bold a underline), přidání obrázků, přidání tvarů a jejich úprava (změna velikosti, barvy, nastavení okrajů, jejich tloušťky a barvy). Uživatel si může vizitku přiblížit nebo oddálit. Následně si uživatel může nechat vizitku vyexportovat. Aplikace nabízí export jedné nebo deseti vizitek na formát A4 s ořezovými značkami. Business Cards Generator lze nadále rozvíjet, například posláním vyexportovaného PDF na Dropbox nebo Cloud.

Business Cards Generator

Declaration

Hereby I declare that this bachelor's thesis was prepared as an original author's work under the supervision of doc. Ing. Peter Chudý, Ph.D, MBA.

All the relevant information sources, which were used during preparation of this thesis, are properly cited and included in the list of references.

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Kristýna Chytilová

May 12, 2019

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Chapter 1

Introduction

Even though we are living in a digital age, a physical business card is still as important as it was years ago. The information provided on the business card should be sufficient and on point. Chapter 2 deals with the phenomena of typography because the text itself is an important element on a business card. It also includes a subsection on typography guidelines focused on business cards and the basics needed to create one.

A good business card should impress the person it was given to. There are many ways how to achieve that effect. The second part of Chapter 2 introduces other aspects to a great design than typography. The effects of colors and shapes are investigated in Chapter 3.

One can have a good understanding of the issues mentioned above, but no experience in using graphic editors. Many graphic editors can be overwhelming, especially the more professional ones. Sometimes even online applications researched in Chapter 4 can be too difficult to use or they simply miss out on the essential functionality. In Chapter 4 is a subsection that discusses the implementation aspects of design in my application based on all information extracted from previous chapters. Later subsection deals with the user interface and its importance. The author was focusing to find the golden mean between functionality and overwhelming appearance.

Having a website with modern user interface still doesn't guarantee its intuitive use. Every software product should be tested, no matter how small and so Chapter 5 discusses types of testing methods followed by the user feedback obtained during the user survey.

Lastly the author has put together several ideas for possible improvements of the online application.

Chapter 2

Overview of Typography Guidelines and Prepress for Business Cards

The text itself is an essential part of a business card. A proper selection of a good typeface can be challenging. This chapter deals with various types of typefaces. Such as what is monospaced and proportional typeface. Followed by an introduction to serifs and options on how to combine typefaces.

Further in the chapter the author will research business cards and what can make them more impressive using special polygraphy effects.

2.1 Font vs. Typeface

For the majority of general public are font and typeface interchangeably used terms even though they should not be. Typeface is a collection of letters and glyphs of a particular shape. Font is a file in a computer containing the typeface [10]. Typeface can also be called a font family.

Typefaces can be divided into several groups. The two main ones discussed further in this chapter influence the final look of a business card the most.

2.1.1 Monospaced Typeface

The monospaced type face is also called a non-proportional, and appears where every character requires the same amount of space [34]. That means that letter „I" will occupy the same amount of space as letter „M" [17]. The space between words or letters has the same width as the letters itself as shown in Figure 2.1 where the gray rectangles have uniform size.

The monospaced typefaces were used in early typewriters where it was mechanically required for letters to have the same size [17].

Today's monospaced typefaces are still used as listings and tables appear to be more readable in it. Code samples in publications are often typed with monospaced typefaces as they give the text a more technical look [15].
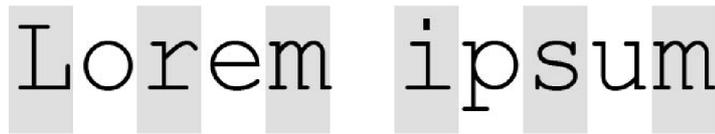
Figure 2.1: Example of monospaced typeface. Font family used: Courier New.

Examples of monospaced typefaces include `Courier`, **`Inconsolata`**, `Anonymous Pro`.

2.1.2 Proportional Typeface

This typeface is where every character can take up different width [12] [34]. Most of the typefaces used today are proportional. They permit more text to be typed in a set amount of space. Figure 2.2 shows an example of proportional typeface where letters have different widths.

Figure 2.2: Example of proportional typeface. Font family used: Times New Roman.

Examples of proportional typefaces include **Helvetica**, **Utopia/Fourier**, Times.

2.1.3 Serif

Serif typefaces feature serifs which are the small feet-like lines at some parts of the letter as shown in Figure 2.3.

It is said that serif typefaces are great for body texts. It was argued that absence of serifs made the text less readable, but further research showed that that is not true as long as every part of the character is visible [15]. This is great news because graphic designers do not have to feel afraid of using non-serif typefaces.

Some letters are easier to recognize in serif typeface. Difference between upper letter „I" and lower letter „l" in serif is much more apparent than in letters „I", and „l" in sans serif [12][52]. Serif typefaces are more serious-looking and traditional. A lot of monospaced typefaces have serifs.

Figure 2.3: Example of serif typeface. Font family used: Times New Roman.

Examples of serif typefaces include **Palatino**, **Utopia/Fourier**, Times.

2.1.4 Sans Serif:

Sans Serif typefaces on the other hand are missing the serifs as displayed in Figure 2.4.

These typefaces are modern looking and many companies decided to change their serif logo into a non-serif one. Sans Serif was not frequently used in the past, because it did not render well on a monitor [55].

$$\textsf{Lorem Ipsum}$$

Figure 2.4: Example of sans serif typeface. Font family used: Arial.

Examples of sans serif typefaces include Helvetica, Latin Modern Sans Serif, Avant Garde.

2.1.5 Combining Typefaces

When making a business card or any other typography design, it is good to know at least the basic rules of combining typefaces. All designers should know the main rules, but of course sometimes it is not enough, as thousands of fonts are available and not all of them are created how they should be. Anyway, in some cases there are exceptions to the rules.

1. Combining fonts from the same font family does not look good [10]. These typefaces often look too similar but not similar enough. The final design feels like the designer forgot what typefaces he/she was using and he/she tried to mach it with some other one.

2. The design will look best with maximum of 2 typefaces [10]. The typefaces should have some similarities like the same x-heights and stroke weight [7]. In this way the text will look like it goes together.

3. Serif typefaces look good with Sans serif typefaces [20].

Font families to avoid include Comic Sans, Papyrus and Curlz [20]. There is nothing really wrong with them, but they were so widely used in the past, that now they just seem overused. A majority of computers with Windows operation system have at least Comic Sans installed on them, thus making the font easily accessible.

2.2 Business Card Anatomy

This section of Chapter 2 will focus on business cards' dimensioning. Similarly, as there are rules to the typography, there are rules one should follow when creating a business card layout as well. From its size to its content and typography.

2.2.1 Card Sizes

There is nothing as defined business card size. Different cultures prefer different card proportions. The most important thing is for a card to fit inside a business card holder. A person should not choose the size of a business card according to the custom of where he/she lives, but should create it according to the expectations of people he/she is giving the business card to. The Table 2.1 contains the most common business card sizes for different countries [53].

Table 2.1: Various typical sizes of business cards

|	
ISO 216, paper sized A8	$74{\times}52mm$
Italy, United Kingdom, Germany, France, Ireland, Austria, Spain...	$85{\times}55mm$
Australia, New Zealand, Norway, Taiwan, Sweden, Vietnam...	$90{\times}55mm$
Czech Republic, Poland, Slovakia, South Korea...	$90{\times}50mm$
Canada, United States	$89.9{\times}50.8mm$
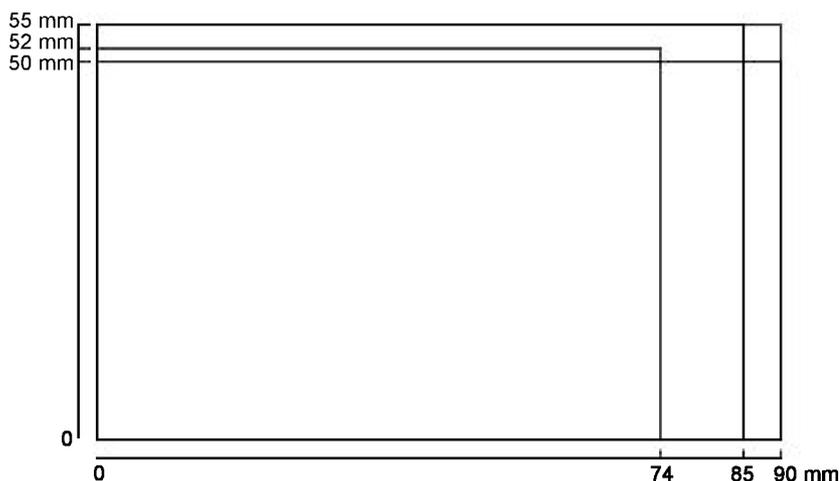
Figure 2.5: Graphical representation of the most common business card sizes.

As illustrated in Figure 2.5, business card has only a small space for text, logos or pictures and it is very important to decide what to share and what not. The content aspect of business card is introduced in the following subsection.

2.2.2 Business Card Content

A business card should contain only the most relevant information such as: company logo and name, person's full name and a job title, telephone or mobile number, contact address, E-mail address, website address and social media accounts [28]. More information will make the card look crowded and the person reading the card would not be able to prioritize which information is relevant. In general it should not take more than a few seconds. A business card for a company will probably have different content than a business card for an individual. Some other ideas to put on a business card are: opening hours, map of where to find the company and QR codes.

2.2.3 Typography Guidelines for Business Cards

Typography recommendations for creating a business card are important, but as already stated, the amount of existing typefaces is huge and sadly not all 7 point typefaces have the same height even though they should. Basic Guidelines include:

1. The chosen typeface should be readable at small size [13].

2. The font size should be kept between 7.5 to 10 points [13]. Sometimes the name of the company can be larger. It all depends on the design itself [9]. It also depends on the sizing of the font.

3. The font size and typeface should be the same for the same group of information [53]. The E-mail address should have the same size and same typeface as a telephone number. These information should be also kept together.

4. Address, phone number, E-mail should be 7-8 points large. Name should be one point larger [9].

5. It is not recommended to put text closer than 5mm to the business card edges. It is pleasing to the eye and when you are cutting out the finished cards there is almost no possibility that you will cut of some part of text.

2.3 Special Effects

A business card does not only has to be a piece of paper with some ink on it. There are many ways how to make the card interesting and unforgettable. It can contain something easy as coloring the edges of the card to selecting a different carrier material than paper.

There are infinite possibilities and it is mostly up to the designer and available resources how the card will turn out in the end.

2.3.1 Material

There is no need to stick to a paper as an information carrier when printing a business card. In this century, special printers are able to put ink on almost every surface. Flexographic printing is able to mark plastic (pens, rulers...), metal, wood and other nontraditional surfaces. Screen printing is great for printing on textile and clothes. Pad printing can transfer an image to a non flat surface [34].

Not every printer that most of households have is able to print on paper that is recommended for business card printing. Grammage of the carrier paper should be between 250-300 g/m^2 [37]. That makes the paper hard to bend and so it can come out of the printer crumpled and with scattered ink. In comparison the most common paper is the one with grammage between 70-90 g/m^2, that is at least 3 times lighter [37]. The final look of the card can be different when choosing a coated paper instead of uncoated one. There are 4 available paper types listed below [3]:

- **Uncoated paper** has no coating so there is no gloss. Office paper is a good example.
- **Matte Coating** has a light coating around 25 %. It is widely used in photography.
- **Gloss Coating** has 50 % gloss and colors looks more saturated than on uncoated or matte coated paper.
- **UV Gloss Coating** has 100% coating. Colors pop out even more when using UV gloss paper.

2.3.2 Embossing

Embossing is a 3D effect on paper. It mostly provides a sense of luxury. This effect can be used for printing Braille text. That means a blind person can trace fingers over the embossed dots and read it [34].

The biggest disadvantage is that the plastic effect will be created on both sides of the paper, but only on one side the shape will be raised. This does not matter if there is nothing printed on the other side of the paper.

2.3.3 Holograms

Hologram is extremely saturated rainbow like effect which can be seen under a good light and an angle. It is used mostly for security but it can look great when used on a logo [34].

2.3.4 Thermography

Thermography is a way how to create a plastic like structure without deforming the other side of the paper like embossing would [34]. Even though it was popular to leave the other side of a business card blank nowadays people like to use all the space they can.

2.3.5 Paper Cutting

Because a paper for business cards is very thick it is easy to cut shapes and logos and bold text into it. The card will not collapse on itself as it would if it was made out of an office paper.

Chapter 3

The Color and Shape Theory in Typography

People are affected by colors in every day life more than they would like to think. It can be as simple and obvious as choosing a product with colorful design over some boring one or it can be an unexplained mood change. Colors evoke emotions and emotions are important in business. People see color green on a restaurant logo and they automatically assume the restaurant is making healthy foods [6]. Similar to shapes, people are not really paying attention to them. Every basic shape has its own meaning.

This chapter deals with the basic color terminology, color schemes and psychology of colors. The author discusses the colors printed on a paper and projected on an electronic device. Last but not least the author takes an insight into shapes and their meanings.

3.1 Basic Color Terminology

Most people are familiar with the majority of mentioned phenomena at least subconsciously, such as what is a hue or a shade or what color groups are available. This subchapter should clarify uncertainty of using color terms. Every color has basic terms that can explain how much the color is vivid, dark or light. Knowing the exact terminology will help with imagining the final color better [27]. Basic color terminology includes:

- **Color** is the thing that we see when we look at something under good light. So red, blue, but even baby pink or french lime are considered colors. Color can be described as dark or light.

- **Hue** is any pure color [32]. It is the main color of the color family. This means hue is red, green, blue or any other color from the 6 color wheel 3.2.1. It is easy to find hue. So if something is pink, the dominant color in the pink color is red, thus red is hue.

- **Value** refers to brightness and lightness of a hue. For example yellow has bigger value than blue as it is more bright [32].

- **Shade** is hue mixed with black. Adding black makes the color look darker.

- **Tint** is the opposite of a shade. It is hue mixed with white. White makes the color appear lighter or it can create a pastel-like feeling.

- **Chroma** is the intensity or dullness of a hue [32]. Chroma can also be called saturation [27]. The more saturation is added the more the color looks pure. Fully saturated colors are primary colors 3.2.4.

3.2   Color Groups

Everything can be divided into different groups based on something that those things have in common. A great helper for explaining color groups is a color wheel.

3.2.1   Color Wheel

Color wheel is a circle containing twelve or six colors. Yellow, Orange, Red, Velvet, Blue and Green are in both color wheel versions. Twelve colors color wheel contains additional „in between colors" like mix of yellow and orange as shown in Figure 3.1 [27]. There are also some shades and tints for better representation.

Figure 3.1: Twelve colors color wheel.

3.2.2   Warm Colors

By taking the wheel and dividing it between green-yellow and green and red and red-violet, one can create two half circles with sections of colors. Warm colors are shown in Figure 3.2 [27]. These colors evoke a feeling of warmth and heat, thus the name [31].
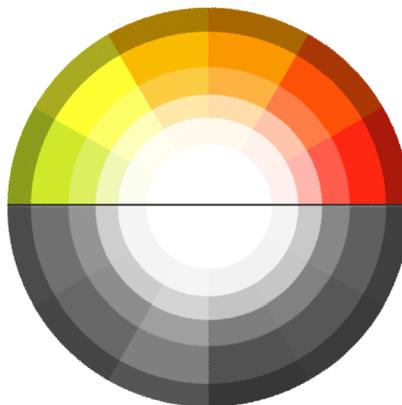
Figure 3.2: Warm colors.

3.2.3 Cold Colors

The other site of the wheel is containing cold colors. From green to red-violet as shown in Figure 3.3. They can be soothing and calming. They can also make a smaller space appear larger. These colors make people think of sky, ice and snow [31].

Figure 3.3: Cold colors.

3.2.4 Primary Colors

Primary colors are those that can't be made by combining other colors. Primary colors on the color wheel are: red, blue and yellow [32]. With primary colors one can create other colors.

3.2.5 Secondary Colors

All colors made by mixing two or more hues are called secondary colors. For example orange is created by mixing yellow with red and is considered a secondary color [32]. Similarly to mixing red with blue which makes color purple, thus purple is a secondary color.

3.2.6 Complementary Colors

Color is complementary to color that is on the other site of the color wheel. So for example complementary color to red is green [32]. Colors that are complementary to each other can make themselves appear brighter. It is not recommended for the text to be complementary to the carrier paper.

3.3 Color Schemes

Not everyone is able to create a design that has colors that go well together. Some people can do it without help without even knowing what is making them feel like the color choice is the right one. Some people need help and that is why color schemes are so popular. Even professional designers use online applications that help them pick the right color scheme.

3.3.1 Analogous Scheme

All hues that are next to each other on the color wheel are considered analogous. For example a combination of green-yellow, yellow and light orange and all their tints and shades is considered analogous. Example of analogous scheme is shown on the left in Figure 3.4 [32].

3.3.2 Monochromatic Scheme

This scheme contains one color and any of its shades and tints [32]. This scheme is often missing an element of a surprise as there is only so much one can do with one color and its shades and tints. Right part of Figure 3.4 shows an example of monochromatic scheme.
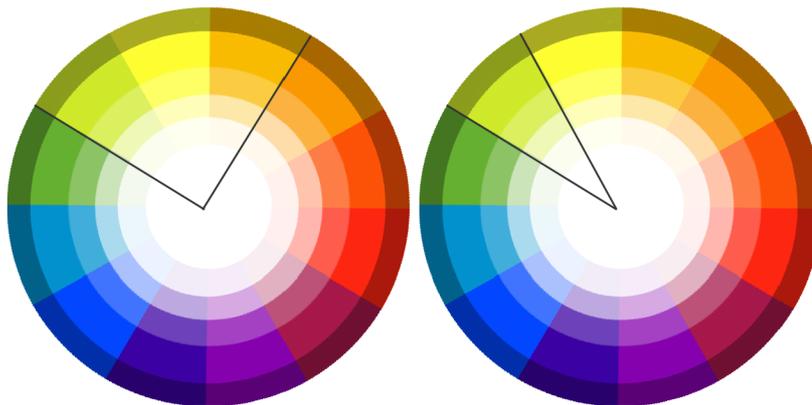
Figure 3.4: Analogous and monochromatic scheme.

3.3.3 Triad Scheme

Triad scheme is when a triangle is put on the color wheel as displayed in Figure 3.5. The tree colors that are on vertices of said triangle belong to this scheme [32]. The triangle can be in different sizes and angles.

3.3.4 Tetrad Scheme

Tetrad scheme is similar to triad with one exception. Instead of a triangle a rectangle is used as shown in Figure 3.5 [32].
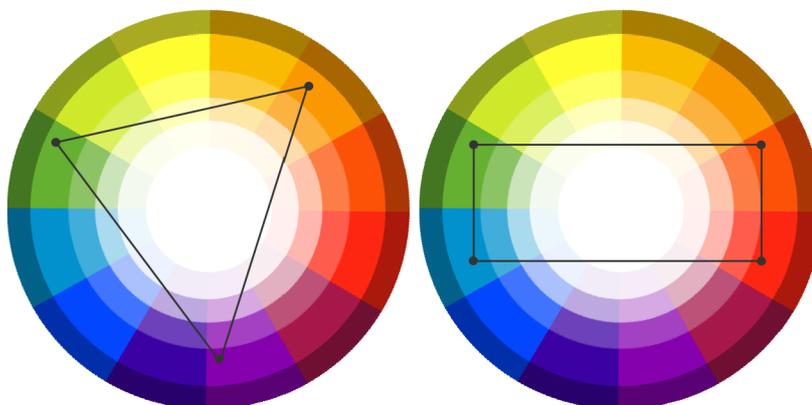
Figure 3.5: Triad and tetrad scheme.

## 3.4 Color Spaces and Models

Colors that can be seen on a display of a mobile phone or on a monitor are not the same as the ones that can be seen on a paper. To understand the difference between printed colors and projected ones, two main color theories need to be introduced.

3.4.1 Additive Color Mixing

This method is used for mixing lights. Such as disco lights or monitor pixels. Every colored light even a white one can be made by combining three primary lights. Primary lights are those three lights that can't be made by combining the other two. It is similar to primary colors on the color wheel. The primary lights do not have to be red, green and blue but in most cases they are [34]. Mixing two out of these tree primary colors we get these secondary colors: Cyan, Magenta and Yellow as shown in Figure 3.6. This method cannot be used for printing.
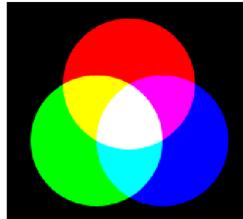

Figure 3.6: Mix of primary lights.

3.4.2 Subtractive Color Mixing

On the other hand subtractive color mixing is completely different from additive color mixing. There are no lights involved. This method is used for painting, drawing and printing. Subtractive color mixing uses real pigments or color filters. It is similar to painting for example with water colors. Even most kids are familiar with subtractive color mixing while using crayons or markers. The more colors are mixed together the darker the color gets but it will never look like a real black color [34].

Three primary colors are in this case Cyan, Magenta and Yellow. Mixing two out of tree primary colors creates these secondary colors: red, green and blue as displayed in a Figure 3.7 [34].
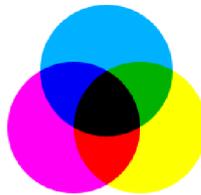

Figure 3.7: Mix of primary colors.

The black-like color in the middle of the figure 3.7 is a non efficient way on how to get a black color. It is not dark enough to really represent black and it is a waste of all three primary colors. That is why modern printers use another color known as Key to print black

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[34]. Graphic designers have to be aware of this, as they are the ones who chooses whether the design uses true black or combination of CMY.

3.4.3 RGB Color Model

This system uses additive color mixing. It is used for example to display images in electronic systems [50]. In digital processing the tree primary colors red, green and blue can have its color intensity from 0 to 255 [34]. That makes up roughly 16 million colors. In programming the color blue can be made by executing following command: RGB(0, 0, 255) where red and green are set to 0 and blue is set to its highest value.

Logically we can't print a picture using additive color mixing. Printer will automatically convert the colors into CMYK 3.4.4 before printing. There are available color converting algorithms and techniques [1].

3.4.4 CMYK Color Model

CMYK color model is based on subtractive color mixing. It is the main color model used in a printing industry. According to a conference held in Guiyou there are 1 030 402 colors that CMYK is able to produce. Which is around 15 million less than what can be done by using RGB [48].

3.5 Color Gamuts

The range of colors of what human eye can see, what printers can print and what electronic devices can project is known as a gamut [34]. As already explained, CMYK can print only some number of colors, but not all the colors CMYK can print can be represented with RGB color model and vice versa. Visual representation of a color gamut is shown in a Figure 3.8.
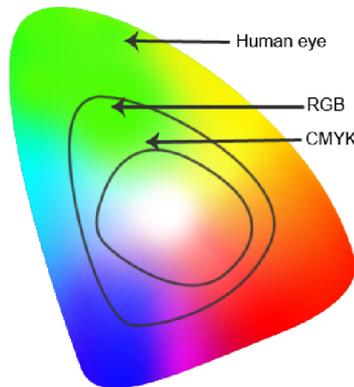
Figure 3.8: Color gamut.

There is no way a real gamut can be printed or even projected on an electronic device, because not all colors a human eye can see can be displayed. However there is a way how to print larger number of colors and that is by adding different colors to primary ones. When a special green spot color that cannot be made by CMYK is used among other CMYK colors, it will make a whole new range of colors that can be printed as shown in Figure 3.6. Now one can print more green colors than before [34].
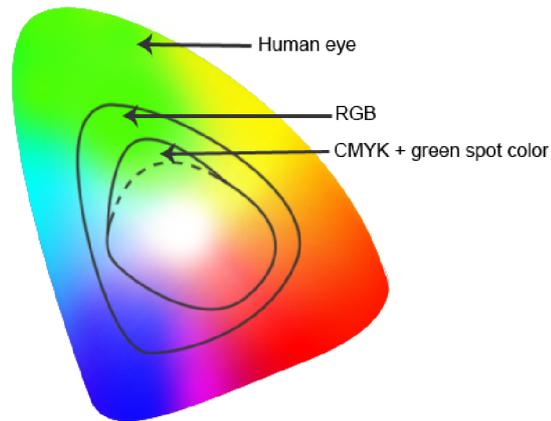
Figure 3.9: Color gamut with added spot green color.

3.6   Spot Colors

Spot colors are made out of premixed ink and in most cases the exact color cannot be replicated by CMYK [29]. Spot colors can be typical color we see in our everyday life, but it can even be gold, neon and all sorts of metallic ones.

Spot color give customer a clear idea about how the color will look when printed, because they always look the same when printed on the same surface. On the other hand a CMYK color can come out differently based on the printer and color supplier [34]. The most frequently used spot colors companies are called PANTONE and HKS.

3.6.1   PANTONE

PANTONE Color Matching also referred to as PANTONE Matching System or shortly PMS contains a little over one thousand spot colors [27]. Every color has its own name, CMYK or RGB equivalent that looks the closest to the real spot color [40]. It is not recommended to choose a PMS based on how the color looks on a monitor.

Companies, such as IBM have a PANTONE color and a CMYK equivalent which they use for printing their logo. In this way the company makes sure the logo will always have the same shade of blue. The PANTONE color used for IBM logo is PMS 2718C [21].

3.6.2   HKS

HKS was named after the founders Hostmann-Steinberg, Kast-Ehinger and Schmincke. It contains 88 spot colors. The whole swatch contains 3 520 colors [34]. This system is mostly used in Germany [29]. Similar to PMS, every HKS color has its own name and CMYK and HEX equivalent.

3.7   Color Psychology

Choosing the right color is very important and it can be more difficult than it seemed at first. Color affects our conscious and unconscious mind. They can change our mood and behaviour without us knowing. Colors can even make someone buy a product without the

person being aware of why did he/she chose that specific product [2]. This chapter will introduce the exploration of different colors and their meaning to our unconscious mind:

- **Red** is one of the colors that is a part of almost every language in the world [2]. People see red and they imagine fire, blood or love. Red evokes emotions such as neediness, danger, passion. It signalizes warning signs [41].

  Red is considered a modern color, thus it is a great choice for a logo design that should make people feel said emotions. It is widely used in fast food chains logos as it attracts attention [11]. In China the color represents happiness and luck. In South Africa red is a color of mourning [24]. In Russia it is associated with communism [2].

  Red belongs to the warm color group and is one of the primary colors.

- **Blue** is the most favorite color in the world. It is the color of the sky and the sea. This color is very popular among logo designers. It is in half of the logos. Blue represents trust, loyalty [41], security and peaceful qualities [47]. This is the reason why it appears in so many logos: Facebook, Twitter and bank logos such as: Česká spořitelna, a.s, Aviva plc, Zurich Insurance plc, Barclays plc and others. Blue is the most calming color but too much blue can cause depression. Lighter shades of blue are associated with magic [41].

  Blue belongs to the cold color group and is one of the primary colors.

- **Green** is connected with nature and growth. It is often used to express health, freshness, approval and balance [41]. In US it represents money, that is why the color green can be found in finance companies [41]. Color green is another color that helps to calm emotions and anxiety [24]. Green appears on flyers and business cards and logos meant for meditation, growth, plant based food and so on.

  Green is one of the cold colors.

- **Yellow** color makes people imagine the sun. Yellow symbolize cheerfulness, happiness [47] and optimism [26]. It is the color that human brain can process the fastest [26]. Optic yellow is the most visible color in a day light.

  Yellow is one of the warm and primary colors.

- **Orange** color is a symbol of energy, warmth and vitality [26]. It is a dynamic and calming color [24]. In America orange is connected with Halloween. It is widely used in traffic, on traffic cones or reflective vests.

  Orange is perfect for creating brand loyalty [47]. Travel companies such as RegioJet a.s., EasyJet Airline Company Limited and Leo Express Global a.s. are known to use this color.

  Orange is a warm color.

- **Pink** is associated with girls these days. This is why it is great for businesses that have something to do mainly with women. From nail painting to dress rental [26].

  Pink can be warm or cold depending on it's value and chroma [26].

- **Purple** is connected to wealth and power. It got its meaning probably because in 1900 B.C. it took about 12 000 shellfish to produce purple dye that could color one

roman toga [26]. This process made the material expensive and mostly kings were able to wear it.

This color is great for creative companies. Purple can make people think of magic. This is the reason a designer would probably choose purple for parapsychology designs that have something to do with magic, spirituality, supernatural and other phenomena. Lighter shades of purple are not used very frequently in design as they represent fragility and weakness [24].

Purple is a cold color.

- **Brown** is a color that goes almost with every other color. It can symbolize pride and luxury as the color of chocolate and coffee is brown [24]. Beside pride and luxury this color can evoke feelings such as: seriousness and masculinity [41]. Not many logos are brown so this color choice would make the final product stand out.

  Brown is a warm color.

- **Black and White** are not colors per se. They are mostly used to lighten or darken a hue of some other color. Black color is perceived as formal, authoritative, modern and luxurious [24]. In some parts of the world, especially on west, black is associated with death and afterlife [24]. On the other hand the color white is connected to spirituality.

3.8   Shapes

Shapes are as important as colors are, especially in design. Learning basic shape names and trying to fit different shaped objects through shaped holes is something kids learn at a young age. Everything human eye can see can be broken down into shapes. House can be viewed as a rectangle with a triangle on top, bicycle as two circles connected with sticks and so on. Shapes have their own meanings. This chapter introduces the basic shapes and what they represent in a design.

3.8.1   Geometric

Geometric shapes are the most common shapes out there: circles, rectangles, triangles and squares [5]. In web design most of these shapes can be easily created using cascading style sheet language. Basic geometric shapes include:

- **Squares and Rectangles** are the most common ones in everyday life and design. People are associating squares and rectangles with buildings. This connection creates the feeling of security and stability. Other meanings are: discipline, strength [5] and they also suggest order [39].

  In design, squares and rectangles are used widely as: menus, buttons, posts, footers and all other layout parts. Business card is a rectangle as well.

- **Triangles** remind people of mountains, play buttons, or pizza slices. Because of its angles triangles represent motion and direction [5]. Triangles positioned up brings the feeling of power and stability. On the other hand, triangles pointing down are viewed as risky and unstable [5] [39].

  In design triangles are seen in play buttons and drop-down menus.

- **Circles, Ellipses and Ovals** are strongly associated with the sun, Earth, universe and everyday items like fruits and vegetables, balls and smiley faces [39].

  Because circles don't have angles, they represent wholeness [39]. They are also seen as soft. Because these shapes remind people of universe some of their meanings are the sense of mystery, magic and eternity [5].

  In design and especially logos, circles are used for the background of a logo. Other than that, circles are used for icons and small buttons [39]. Three circles under each other give the feeling of a hidden menu.

3.8.2 Organic/Natural

These shapes represents shapes created by nature such as leaves, flowers and animals. Natural shapes should be used in design that is somehow connected to nature, freshness, healthy lifestyle, veganism, ecology and other similar topics. The difference between geometric and organic shapes is that organic have straightforward meaning. They are not subliminal [39]. A reindeer is a reindeer, but a yellow circle can but does not have to represent the sun.

3.8.3 Abstract

Abstract shapes are simplified natural and geometric shapes. Most common use of abstract shapes are in logo design and icons. Sometimes it can be hard to guess what does some abstract shape represent.

Chapter 4

Internet Based Business Card Generator

This chapter is dedicated to research of available business card generators, with emphasis on their strong and weak parts. Other parts of this chapter focus on requirements for the website application, user interface and the technology used in designing the web application.

4.1   Business Cards Generators

As already mentioned before, not everyone is able to create a business card. It can be the lack of experience in the field, or missing ability to work in a graphic editor or a typesetting program. Good editors and programs are often not free and a 7 days trial is not enough for a person to get to know the program without previous experience. That is where website and desktop applications come to the rescue. Desktop applications can be great when the user knows what he/she is doing. The downside is that these applications have to be installed. Websites that offer a business card creation can be found easily and only some of them require online registration. The great thing about websites is that our personal computer will stay free of programs we would use only once. The other great thing is that most of these websites offer the basic creation for free and only some other features for money. In most cases the basic account will do.

As the author will create a website application, the focus will be on website business card generators. There are many out there and so chosen generators will be only those which can be easily found with one Google search.

4.1.1   Bizcardmaker

The Bizcardmaker [23] offers a lot of templates to choose from. After choosing a template and filling in the main information the user can choose from 7 typefaces and some basic font settings such as size, bold, italic or underlining. User cannot choose the font color as that is given by the chosen template.

Text and image can be moved around by dragging. A dotted frame appears while hovering over editable element. The card has only 3 text boxes and 1 image.

Above the business card there is a reset button. This reset button only puts the text boxes and pictures in the same position they were originally. Changing a template after already making some other changes in text is possible. Pictures and text will remain

unchanged, but if the user picked another font family, it will automatically return to Open Sans. Figure 4.1 shows an example of the site.
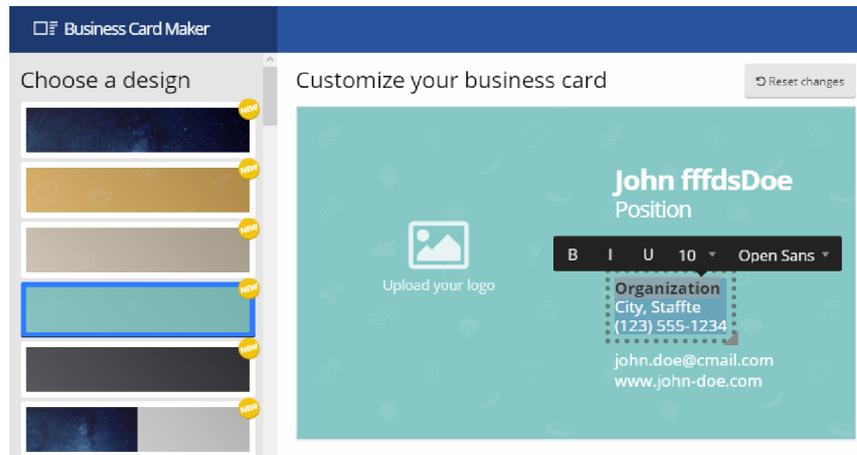

Figure 4.1: Example of the site Bizcardmaker with active edit menu.

User does not have to register to the website to download the finished card. There are two ways of exporting the card. One is JPEG and the other is PDF. The PDF has crop marks and bleed area. Both versions contain only one card. Probably no one would want to print only one card and that means that the user would have to download the JPEG version and somehow create a PDF document with more cards.

4.1.2 FreeLogoServices

At FreeLogoServices [16] user can choose from more than 1000 card designs. The business card template is fixed and cannot be changed later. After choosing a template the FreeLogoServices takes the user to a website application for card editing. There were no settings for the business card's size.

The editor offers a lot of ways on how to personalize the card including the basic font setting and color change of a typeface. User can add an image or a new text box.

One of the advantages of this site is that it shows a safe line around the working area, in polygraphy mostly known as bleed. There is also an ability to edit the back of the card.

The text boxes can be moved around, but the text can be changed only in the left menu. If a new text element or picture is added, it will appear under all other elements. There is no Z-index setting, so there is no way to bring the new element forward.

Edit menu for text is visible even if the user is currently holding an image. The editor does not have a feature for adding shapes. Figure 4.2 displays an example of the site with chosen template.
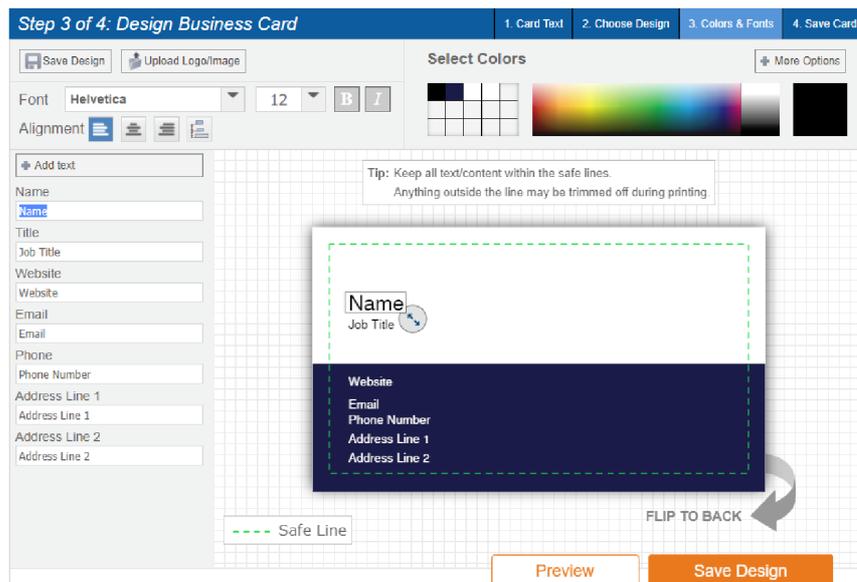
Figure 4.2: Example of the site Freelogoservices.

This service is not free and without paying, the user cannot download a PDF file or even just a JPEG with the business card design.

4.1.3 tisknisi

As many other websites these days even tisknisi [51] does not offer only creation of business cards. Tisknisi is a company that specialize in polygraphy. From prepress to postpress. They do flyers, calendars, folding flyers and other printed materials.

User can choose from card templates and its color variations. Templates are in two sizes 90×50mm or 85×55mm. The text on the card is fixed and cannot be moved around. This means choosing the right template is essential. The editor offers basic text settings like changing typeface, size, adding bold, italic, underline and changing a color. Users cannot add logos, pictures, new text boxes or shapes. Figure 4.3 shows an example of the website with active menu.
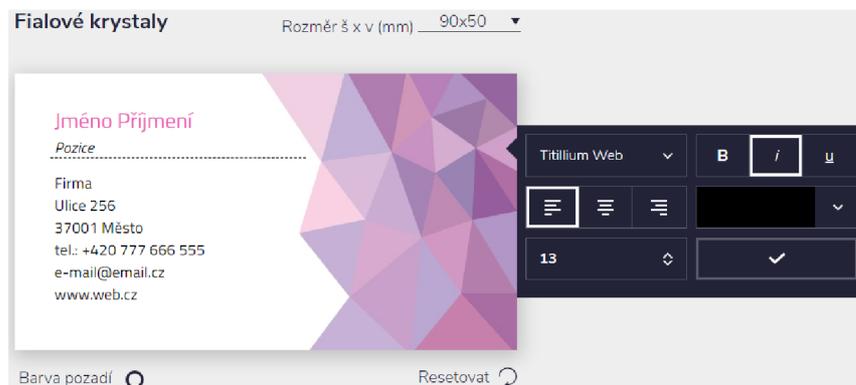

Figure 4.3: Example of the site Tisknisi with active menu.

The site does not offer to download the PDF or JPEG file for free.

4.1.4 internetPrint

The internetPrint [22] is again one of the websites that offers many templates to choose from. The template is essential as there is no way of styling anything or even change color of the text on the business card. Template can be changed into another one without loosing the information user already provided. There is a set number of text boxes to write information in. It is done by filing in text boxes. The text on the business card cannot be moved around.

User can choose the size of a business card depending on his own needs. Figure 4.4 displays the working area of the website application.

Figure 4.4: Example of the site Internetprint.

The site does not offer to download PDF file, but user can buy prints of the cards.

4.1.5 PsPrint

The PsPrint website [43] offers once again the possibility to not only create business cards but also postcards, greeting cards and other printed materials.

User can choose from countless amount of templates. Chosen template can be changed in the process of creating the card and no text information will be lost after converting to another template. One template often contains more than one color variation. Sometimes they have back designs as well, so user can personalize both sides of the card.

The editing application offers to display ruler and bleeding area. The site also allows the user to resize the card. Pictures and objects can be added to the card and they can be resized as well. Color of objects can be changed. There is no layering system. That means that user has to think before making any changes. Every new element will cover all other elements. The last interesting thing is the ability to change the edges of the card. Figure 4.5 shows the website application with active text element and text menu.
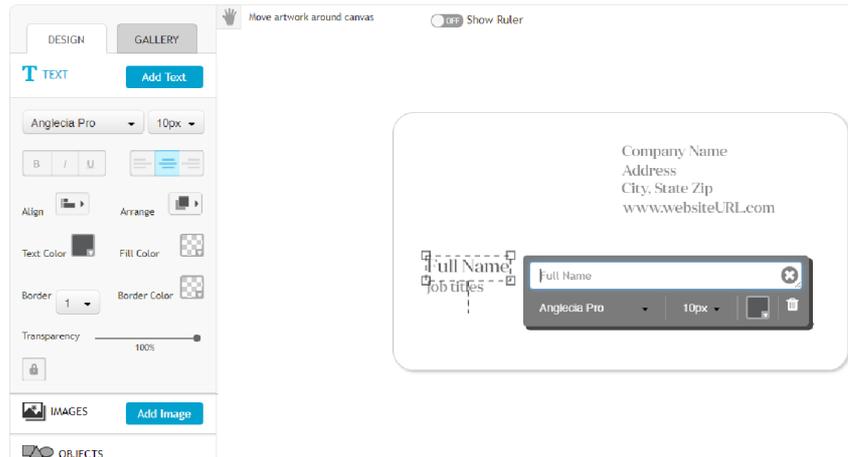
Figure 4.5: Example of the site Psprint with active edit menu.

The final PDF is unusable as the company put watermarks all over the business card. User can order printing of the cards.

4.1.6 ReticulaCARD

The ReticulaCARD website [42] is one of the simple website application. No registration is required. User is taken to a site with business card templates. There are more than 100 templates. The biggest disadvantages of this website is that user cannot move the text around. There is only one textbox and every text styling will reformat the whole text. Tabulator key to indent text is not working.

Pictures or logos cannot be added but a colorful rectangle can. The rectangle can be transformed and there is even an option for opacity. Figure 4.6 displays the working area and active menu. The final result is not as professional as is could be using other online applications, but this website is that it generates PDF file with 10 business cards and crop marks. The number of business cards and its sizes can be changed. The second option is to export the card as JPEG. The JPEG file contains only one card.
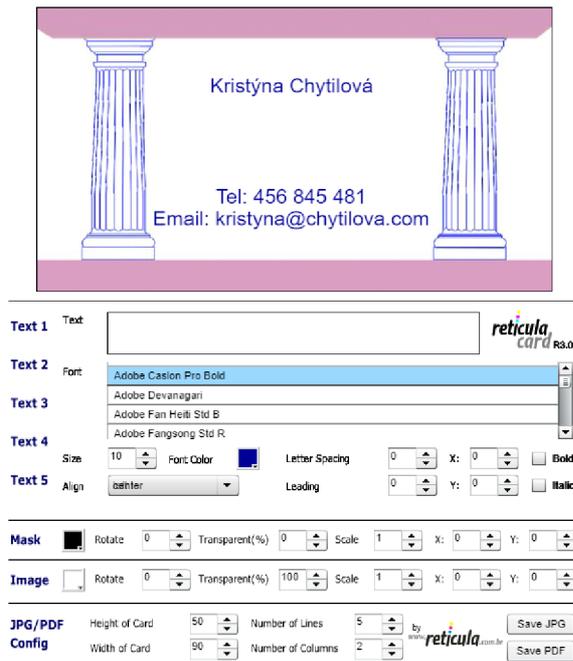
Figure 4.6: Example of the site Reticulacard.

4.1.7 Spark

The Spark site [4] is almost as complex as some photo editors. There are many typefaces too choose from and every font can be edited with special effects such as shadow, outline and some others. There were no bold, italic and underline settings, but the site offers other settings that were not in the previous sites, like text alignment, letter and line spacing, opacity and even making the letters capitalized. The whole card has some color scheme that can be changed into a different one. If the user likes a certain color scheme but does not like the color of a text he/she can choose a different font color from suggested colors. Figure 4.7 shows a part of the website with active text menu.

The downloaded card is in JPEG format with sp Adobe Spark watermark in lower right corner. The site does not mention the size of the card and it does not provide PDF conversion.
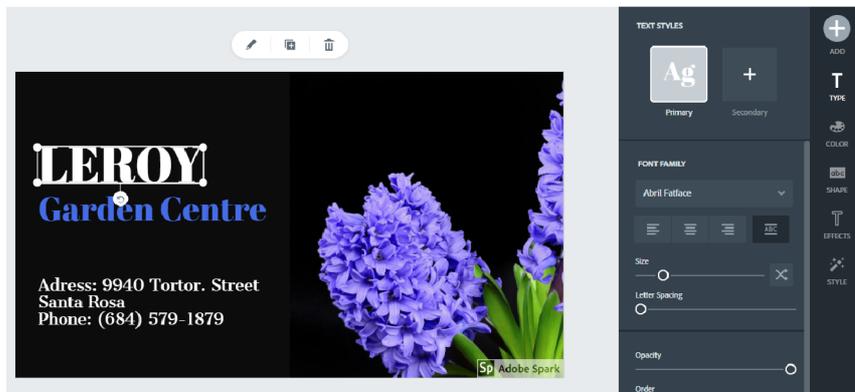
Figure 4.7: Example of the site Spark with active edit menu.

4.2   Requirements for an Application

This part of a chapter will discuss important features that a business cards generator should have. It will be focusing especially on those features that were not common in business cards generators researched in the previous part of this chapter.

4.2.1   SWOT Analysis

SWOT analysis was conducted to analyze strengths, weaknesses, opportunities and possible threats of the business cards generators website researched in previous section.

Strengths:

- The design can be saved for future.

- Printing and delivery of the business cards.

- Large range of products can be made other than than business cards.

- Chosen template can be reset into its original state.

Weaknesses:

- Too many or too little templates.

- Free PDF file with crop marks option missing.

- Items cannot be arranged with a use of Z-index.

- Low image and shape import support.

- Set number of textboxes without the option to add a new one.

Opportunities:

- Paid advertising could be effective to increase website traffic.

- Creating a mobile application to increase usability on mobile devices.

Threats:

- Decreasing market demand.

- Paper Business Cards becoming obsolete.

- Difficult to use on a mobile phone even though mobile traffic is increasing.

- Competitors are offering free PDF export.

All researched generators could be divided into two groups: those that are too simple with low functionality and those that are too difficult to use for someone who has little experience with graphic editors.

The simple generators are still usable, but they have way too many templates to choose from. It could take hours to find a suitable design.

The too difficult generators are giving the user way too much power over the design. They have many features to choose from. These generators are more of a typesetting editors than business cards generators. They are not focusing solely on the business cards.

From all the generators almost none of them had the feature to download PDF file with more than one business card and crop marks.

The designed application will be able to generate PDF with crops marks. And functionality will be somewhere between too simple and too difficult. The author's vision is to

give the user the ability to move elements around, change typefaces and add photos. The user will have the possibility to choose from few designs that will be editable if needed.

4.2.2 Website Application

Creating a business card isn't something a typical person would do every day. If the application was a desktop one, the user would have to download and install it and then he/she would use it probably once. And after some time he/she would uninstall it from his computer. If the application was a website application, the user could definitely mark the site as favorite and then come back a year later when a need for another business card appears.

4.2.3 Templates

The researched business card generators had mostly templates that included a background picture and some styled text. Most of the time the chosen template could not be changed into another one and the background picture could not be changed.

The aim is to prepare the whole card before hand without using images as a background. Choosing a template does not have to be a final and most important decision. User would be able to still move the elements around and choose a different font, style typeface, add pictures, shapes and change color. One of the options will be a clean template with nothing on it. All the templates will serve as a guide ready to be filled with information about the user.

4.2.4 Add/Remove Elements

A template will already have a set number of elements. But the user can still remove those and add new ones. This feature was not very common in the business cards generators that were researched. Elements in the designed applications will be:

- Text element - this element will be used for name, surname, company name, address and other text information. This element is the key element of the business card.

- Image/logo - images can be used for background, logo or a map.

- Shapes - square, circle, rectangle and oval. Boxes of color are important in any design as it can make it look better and whole.

4.2.5 Basic Text Element Styling

Users are used to having text in bold and italic and underline. Sizing and changing a typeface should be a must in every design application. And last but not least a change of color is welcomed. One of the options is to have a text alignment as well. It is not common, but it is an important feature for styling the text.

4.2.6 Z-Index

Z-index determines where on Z axes will the element be. This way an element can cover other elements or it can be covered by other elements. This allows the user to add pictures. It is necessary to have a z-index manipulator, so the user can move the image, text or shape to the background or bring it forward.

4.2.7 Adding Shapes

An option of adding different shapes is important. A simple rectangle can divide the business card into logical parts. All shapes:

- rectangle,

- square,

- circle,

- oval.

Triangle is not possible to do with simple CSS especially if the user could style the triangle's border. It was decided to omit this shape from the designed application.

4.2.8 PDF Output

A PDF output with crop marks is probably the most important feature of any business cards generator website. Only a pitiful amount of available generators was found with this option for free.

It is intended to have a feature that creates a PDF file with business cards and crop marks and the user could choose if he/she want 1 business card or more on 1 paper.

4.3 User Interface

User interface is probably the most important thing on a website. Hard to understand functionality can make the user leave the site and never come back. Or if something that could be done with one click has to be done with many clicks can make the user go to another website. The intention of this subchapter is to pinpoint the most needed user interface rules.

4.3.1 The 80:20 Rule

The 80:20 rule is not exclusively for user interface. One can come in touch with it even when learning how to play an instrument. It says that 20 percent of any product or any website is needed or used 80 percent of the time. The other 80 percent should be hidden, removed or minimized [54].

Many websites have a menu which is a series of options presented by the website. The menu can be perceived as the 20 percent and by clicking on a option of a menu that opens other options, we get the other 80 percent.

4.3.2 Visual Hierarchy

The most important elements should be the biggest. Elements that go together logically should be nested together visually [30].

4.3.3 Cursor

It should be very obvious what is clickable, draggable or resizable and what is not. Computer users are used to a cursor changing from an arrow to a hand when hovering over

a clickable element, but this cannot be used on a mobile phone. This can be resolved by using a button or underline the text of a link.

When moving an element or something else onto a different place the cursor should change to an all-scroll cursor. When writing a cursor should change into a text cursor. If something is resizable a small triangle should appear on the bottom right corner of the element and when the user grabs the triangle, the cursor should change into a two sided arrow.

4.3.4 Confirmation

A dialog is opened before a critical task. For example when sending an E-mail without a subject, the E-mail client will alert the user that the E-mail has no subject and it will ask whether it is okay to proceed [54].

4.3.5 Control

Website should present options that are easy to understand even for inexperienced people. More difficult options should be hidden, but accessible if the user decides to use them [54].

4.3.6 Constrain

It is a method that limits options the user can choose from. Either by dimming the non-usable options or removing them. Constrain reduces the possibility of an error [54].

4.4 Implementation

The website Business Cards Creator will be implemented based on knowledge obtained in previous chapters including typography, color theory, requirements for an application and user interface.

4.4.1 HTML and CSS

HTML is a hyper text markup language invented by Tim Berners-Lee in 1993. It is used to define how the web page should be structured what it should contain and how it should look. It uses tags, sometimes referred to as elements to do that [45]. Main HTML tags used in the website include:

- Textbox - serves for users to write their information in. In this case it will be used to fill in Full Name, Position, E-mail, Address, Telephone Number...

- Button - a click on a button usually indicates that some action should be executed. Buttons are used in menus.

- Select - is a drop down menu where the user can choose from set number of options. The select tag is used for choosing a font size and font family type.

- Img - displays a given image.

To this day HTML was not replaced by any other technology and it is still popular and needed.

It is possible to style HTML in the HTML file, but that can look confusing. This is were CSS comes in place. CSS stands for cascade style sheet. It styles the appearance of a website by influencing the tags in a HTML document. CSS is still being developed and that is why some browsers can display website differently than others [45].

CSS has many useful features. One is a `:hover` selector. In the website when the user hovers over some draggable element a dashed border appears around the element indicating, that it can be moved. The website applications also has few simple animations implemented that give the website more interactive feeling. For example when the user clicks on a Template button, a menu will eject from a side.

4.4.2 JavaScript and jQuery

JavaScript was created in 1995 by company called Netscape. It has nothing to do the with the programming language Java. Netscape chose the name because of marketing reasons; Java was getting popular [35].

jQuery is a JavaScript library. It makes programming in JavaScript easier. Code that could be multiple lines long in JavaScript can be just one line long in jQuery [35].

JavaScript can check whether user filled out a form correctly, it can make elements on the website appear, disappear, it can re-style elements [35]. The website is going to offer the user a template with set styling, but he/she will have the ability to re-style the it differently. For the ability to move elements on the business card in all directions, jQuery function `draggable()` was used. Images and Shapes can be resized with jQuery function `resizable()`. If the user clicks on something on the site, JavaScript checks what was clicked on and it acts on it.

4.4.3 Web Application Business Cards Creator

The final web application Business Cards Creator is made out of one main HTML file and several CSS and JavaScript files including JavaScript libraries.

The website consists of 3 menus and a work space with an empty business card. It is following the 80:20 rule by hiding options that are not necessary. For example an edit menu shown in Figure 4.8 shows only when a text element is being clicked on.

The background of the website is gray to not disturb the user when making a card. Gray color is easy to combine with other colors, so it will not adversely influence use of other colors on the business card.
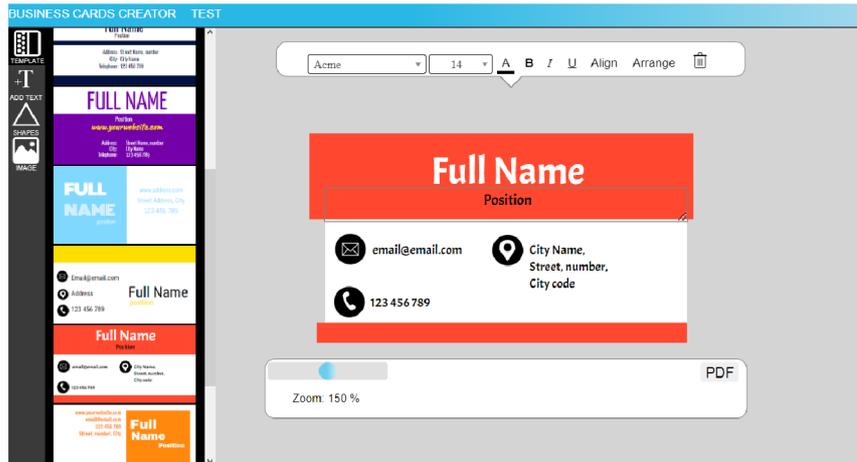
Figure 4.8: Example of the site Business Cards Creator with active text edit menu.

Figure 4.9 on the other hand shows an example of the application with hidden edit menu and opened left main menu.
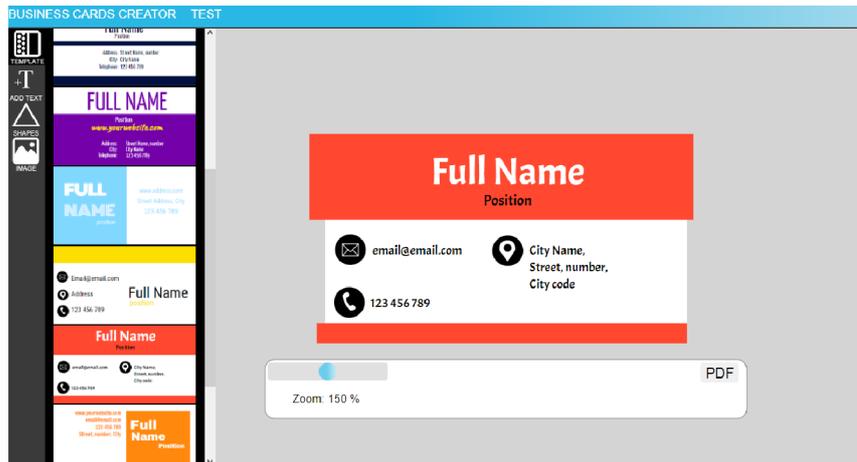
Figure 4.9: Example of the site Business Cards Creator with active left main menu.

Main Menu

Main menu can be seen on the left site in Figure 4.9. Beside the 80:20 rule it also meets the requirements for visual hierarchy. All 4 menu buttons add something to the business card.

Main menu options:

- Add Text - this option add a new textbox on the business card.

- Add Template - this option opens up a hidden menu that contains pictures of templates which user can choose from.

- Add Shapes - after clicking on this option a menu with shapes is opened. User can add a shape on the business card.

- Add Images - in a hidden menu which opens after clicking on this image, the user is presented with an option to load his own image. The loaded image appears directly on the business card.

Top edit Menu

Depending on what item on a business card is selected, the top menu changes. If no element is selected the top menu disappears. An example of text edit menu is shown in Figure 4.8. This menu also uses the visual hierarchy rule and constrain. All top edit menu options are:

- Choose Family Font - more about this function is specified in section 4.4.3.

- Choose Font Size.

- Choose Color of the Typeface - opens a pop-up menu with pre-set colors and an option of choosing any other RGB color described in section 4.4.3.

- Italic - makes selected text italic.

- Bold - makes selected text bold.

- Underline - makes selected text underlined.

- Choose Border Style of a Shape - opens a pop-up that contains change of border color, its width and it also has an option to round edges of a selected shape element.

- Align - there are 3 align options: to left, to center and to right. It can be used only on a text element.

- Arrange - this opens up a pop-up menu with option to move the element to the element up or down the Z-axes.

- Remove - removes a selected element.

Bottom Menu

All options in this menu have to be visible at all times. Especially the PDF export button. Bottom menu options include:

- Zoom Slider - user can scale down or up the work space. The business card is shown at its 150 % size and the size can go to up to 200 %.

- PDF - a PDF file with the final business card is generated and automatically downloaded as specified in section 4.4.3.

Through out the whole process of creating a business card, the user is accompanied by visual effect that helps him with understanding of the functionality. Textboxes, shapes and other elements on the business card are clickable, draggable and resizable. To indicate that the element is draggable an all-scroll cursor is used. If the user clicks on a textbox the cursor changes into a line as users are used to having line cursor when writing. Resizing an element changes the cursor into a double arrow.

Buttons in top and bottom menu change color to light gray when clicked or being hovered over, indicating they can be click on. If an option is presented, but cannot be executed a cursor changes into a not allowed cursor.

Image Import

FileReader which is an asynchronous API, is used for uploading an image. When the user clicks on 'Upload A Picture' a file dialog opens and user can choose an image. If the image is PNG, JPEG or GIF the image loads on top of the business card. Otherwise a dialog window opens with an error saying the file type is not supported. If the image is larger than the business card size, the image automatically re-sizes.

PDF Export

For PDF file creation, the application uses external JavaScript library jsPDF [36] that is able to convert parts of HTML code into a PDF file. This functionality was used to take the HTML code of the business card and export it into a PDF. Crop marks were not a part of the HTML code and so they had to be added manually one by one by specifying the line coordinates.

Family Font Picker

A JavaScript library HiGoogleFonts [44] was used for choosing fonts. It contains 100 Google Fonts. The benefit of using this library is that only the typefaces that are being used are downloaded. That means that the user's computer will not download all 100 fonts in advance, but it will only download the selected ones.

Color Picker

Having a color picker is necessary for an application like this one. The application uses the iro library that includes a color picking API.

   The website has 16 default colors ready to be used, but if the user does not like any of them, he/she can click on a '+' button and a color picker will appear. This option is presented for more experienced users and it is following the control user interface principle. Chosen color appears between the default colors, so user can use it on more than one element without the need to pick the color from a color picker again. Figure 4.10 shows a pallet with 16 default colors and a color picker.
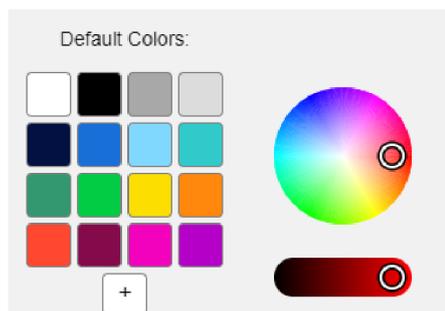
Figure 4.10: Default colors and a color picker.

Templates

Templates are a big part in the designed business cards generator. 9 business card templates were created using the knowledge obtained in color theory and typography. When user

chooses a template by clicking on it a JavaScript code executes and replaces a part of HTML code with a new one. Example of available templates can be found in Figure 4.11.
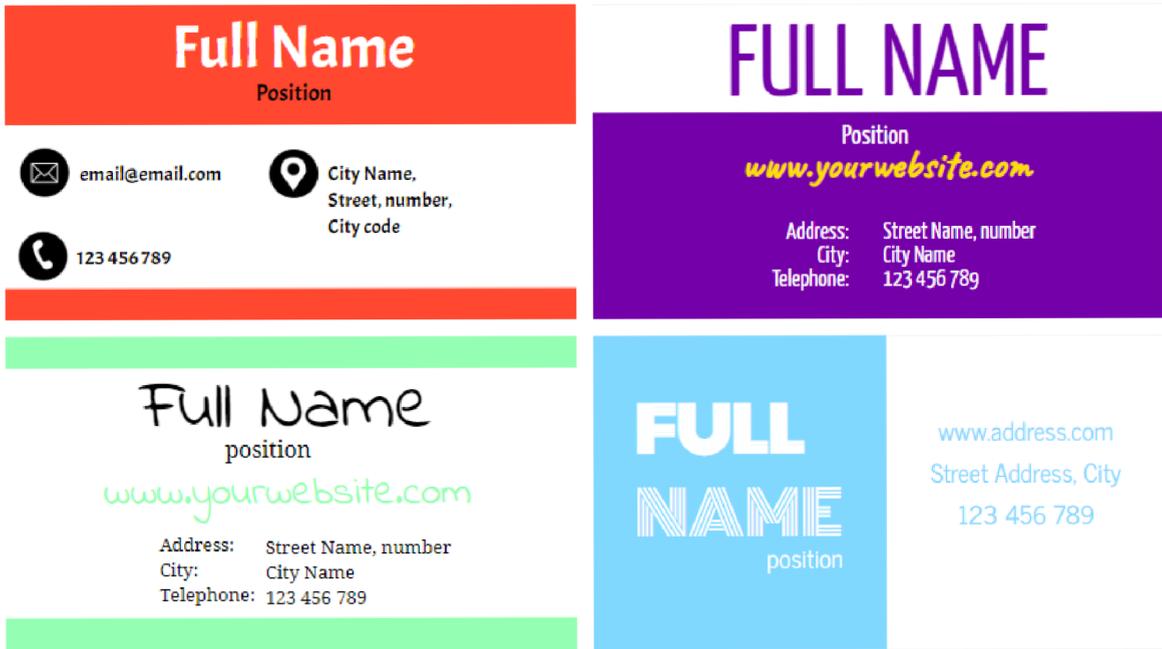

Figure 4.11: Examples of some available templates.

Chapter 5

Testing and Evaluation

Every product should be tested before it goes live. This way the creators will know what works and what doesn't work and not only in terms of functionality. If users have to think hard to figure out how to navigate through the website something is not right.

Testing should be done through all stages of creating so that there is enough time to fix issues. Unfortunately, this is not done enough [30]. This chapter will be divided into two parts. Testing theory and testing execution.

5.1 Types of Testing Methods

This chapter introduces main types of testing methods for software.

5.1.1 Functional Testing

Functional testing examines whether the software works from the user's perspective. If links are redirecting to the right site or if buttons have desired functionality [49]. All types of functional testing should be isolated from each other so they can be executed at different stages of software development [14]. Functional testing include:

- **Unit Testing** tests individual components of a software are being tested to make sure they are working properly. It is mostly performed by the developers and not testers, because this type of testing requires deep knowledge of the code and the idea behind it. The most common unit testing is checking if a cookie was set after user's login or if a function is returning desired output [25].

- **Integration Testing** performs after executing unit tests, integration testing checks that the tested components work as a whole. That they collaborate the way they are designed to. For example after user logs in, he/she is taken back to the page where he/she was right before he/she clicked on the login button [14].

- **Regression Testing** checks whether a new functionality or a component is added to the software, adversely affects the functionality of older components. It is a selection of already written test as part of unit or integration testing [19].

5.1.2 Non-functional Testing

This type of testing examines the non functional aspects of the software such as usability or performance [18]. There are several types of non-functional testing including:

- **Performance Testing** shows how the system performs when being used. The test analyzes the software responsiveness, stability, reliability. The results of performance testing are called key performance indicators or KPIs and they can be for example number of virtual users, hits per second or response time. If the testing was successful depends on the goals the creators have for the software [38].

- **Usability Testing** makes sure end-users are not stuck on something when using the website. When building a website the creators should keep in mind rules of user interface 4.3. But sometimes even when the website is created according to user interface rules it is not enough and the end-users can have trouble using it. That is why usability testing is important [46].

- **Compatibility Testing** makes sure the website runs smoothly regardless of operation system, or browsers. Some website features can be working in one browser, but they don't have to work in another [49]. Compatibility testing should give the creators an idea of what needs to be fixed for what platform. Some website will never be functional in some web browsers and a good habit is to let the user know what web browser is the best to use when viewing the website.

  There is and always will be a debate about which web browser is the best one. These 4 browsers are the most frequently used and people are expecting that websites will work in them: Mozilla Firefox, Google Chrome, Safari, Opera [8].

5.2 Testing Execution

Business Cards Creator is not a typical website and it had to be tested it as such. The author chose to perform functional and selected non-functional testing methods.

5.2.1 Functional Testing Execution Overview

This testing consisted of checking if everything works the way it should. The testing is summed below:

- **Unit Testing** was being executed throughout the whole process of creating the Business Cards Creator. Business Cards Creator consists of a series of buttons, templates to choose from, clickable objects and drag and drop elements. Unit testing provided useful feedback and discovered *bugs* that were later fixed.

- **Integration Testing** was focusing on the use of the Business Card Creator as a whole. It was necessary to check if user interface reacts the way it should or if exporting a PDF file triggers the process of creating the file.

- **Regression Testing** was being executed several times. The final testing was done by users, where they tried out all functionality as specified in the Appendix 5.1.2. This way it was made sure all functionality is working as expected.

5.2.2 Non-functional Testing Execution Overview

- **Performance Testing** was focusing on the loading time of the Business Cards Creator. It was calculated that the website is fully loaded and ready to be used approximately after 1100 ms of loading which is below the norm compared to other websites

[33]. The average loading time of the business card generators researched in previous chapter is 4700 ms.

- **Usability Testing** indicated how easy it was for the user to navigate through the Business Cards Creator and if the user could figure out what is going to happen upon clicking on a button. It was essential to make sure the user tries as many functional aspects as possible, therefore simple tasks were provided for the users to follow. User can hover over a button with 'TEST' sign written on it and it will open a pop up window with the tasks he/she is expected to perform. A copy of all of the tasks are in Appendix A.

  This also helped to decide if the website is logically structured, if the edit buttons are properly marked and if the user has an easy time understanding the website.

  An important part of usability testing was filling in the questionnaire shown in Appendix B. The responses to the questionnaire are further discussed in this chapter, as they provided useful feedback and conclusions drawn from which were later implemented into the Business Cards Generator.

- **Compatibility Testing** was executed on web browsers summed up in Table 5.1.

Table 5.1: Compatibility of Business Cards Creator with various browsers.

Browser	Version	Functionality
Google Chrome	73.0.3683.103	Full
Opera	58.0.3135.132	Full
Mozilla Firefox	66.0.3	Full
Internet Explorer 11	11.0.9600.19326	None

In the main and widely used browsers introduced in 5.1.2 the Business Cards Creator is fully supported and functional. Internet Explorer is not able to load Business Cards Creator properly. The problem seems to be an external library for generating PDF files. Solution would be to use a different library, but after an extensive research it proved to be difficult to find a suitable solution.

5.3 Questionnaire Evaluation Overview

This part of the chapter will focus on evaluation of all answers provided by the users that tried to make a business card using Business Cards Creator. The questionnaire showed in Appendix B is focusing on the following:

- Test Group - about user and his/her graphical background.

- User interface and design.

- Layout Logic.

- Additional Questions - about element logic, missing features or misleading buttons.

5.3.1 Test Group

Test group was composed of 30 people with different computer knowledge. Important question is how many people already had some experience with using graphics editors. The reason behind this is that the Business Cards Creator has similar functionality and interface as some graphic editors. This will show how many people are struggling from using the website because they don't have any experience or because something is not understandable. Figure 5.1 shows a graphical representation of gender, age and experience with using graphics editors and using business cards generators.
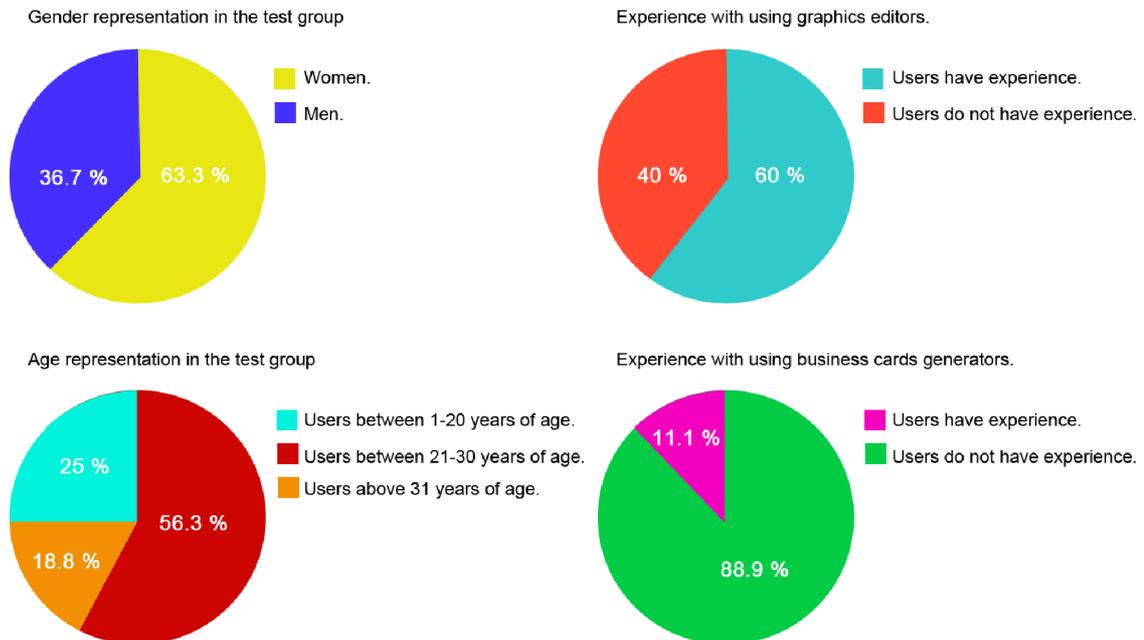

Figure 5.1: Experience in the test group.

5.3.2 User Interface and Design

In this part of the questionnaire the user was asked about his thoughts of the interface.

- **Overall Impression: 4,1.** Overall impression was good. Researching existing business cards generators provided an insight into were the main elements of the websites are typically placed and so the website is not confusing or untypically structured.

- **Typeface Readability: 4,7.** This factor was very important. The choice of non-serif typeface was motivated by design intentions of adding a modern layout.

- **Chosen Colors: 4,3.** Few users commented that the selected colors are appropriate and that they do not disturb while creating of a business card.

5.3.3 Layout Logic

This part of the questionnaire was focused on menus and their layout.

- **Overall Impression: 4,2.** The Left Main menu and top Edit menu were rated very good. The lowest ranking among the menus was assigned to the Bottom menu with a an overall rating of 3,6 points.

The users appreciated icons in the Left Main menu. Some respondents indicated, that the icon for adding text can be misleading. The problem was solved by changing the picture as shown in Figure 5.2.

Figure 5.2: Menu button before and after.

It is true, that the before icon without the '+' character could mean anything that has something to do with editing text.

5.3.4 Additional Questions

At the end of the questionnaire there have been a few questions for the users. Here are some which gave the author an interesting feedback to be followed up upon.

- **Have you had any trouble understanding some button/s functionality?**
  People with some experience with graphics editors had almost no difficulty understanding the functionality behind the buttons. People with little experience had some trouble with understanding the minimalist design of a button for changing the color or changing the border style. Of course this confusion disappeared after using the assigned functionality

  The author responded to this finding with changing the 'change color button'. The new button has a thicker underline indicating what color is selected as displayed in Figure 5.3.
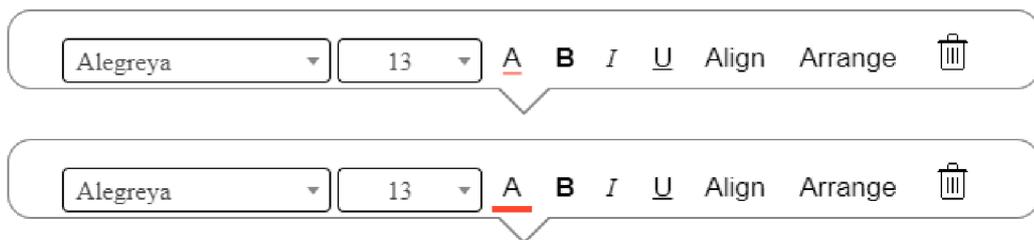
Figure 5.3: Edit menu color button before and after.

- **What you didn't like on the website and its behavior?**
  When the users selected a template and then he/she clicked on a textbox he/she wanted to change, the cursor of the mouse appeared at the start of the textbox. This meant that the user had to either click again at the end of the textbox or use a Delete key instead of a Backspace to delete the text and replace it with his own.

  This issue was fixed and now when user clicks on a textbox, the cursor appears at the end.

Chapter 6

Suggestions for Future Work

Any project, any application will never be fully finished. There will always be new features to add or try. Some of them are listed bellow.

- Add different sizing for business cards.

- Add the ability to edit the back side of the card. It is more and more common for a business card to have an imprint on the back side of the paper carrier as well.

- Add server that will allow saving the work for the future. Business card is not something a person spends a week on, especially if he/she can choose a template and simply fill in the needed information.

- Add the ability to rotate the elements around.

- Add more text styling options for example letter and line spacing.

- Add the ability to be able to reverse changes.

- Add a copy element feature.

- Add keyboard support. Some people are used to using a keyboard to do some tasks. For example pressing a delete button should delete the active element and arrows should move the element in chosen directions.

- Create a mobile application.

- Add a feature to send the final PDF file to a mail address or save it to Cloud or Dropbox.

These are some features which the author would like to implement into the application in the near future.

Chapter 7

Conclusion

The goal of this work was to design and implement web based business cards generator. It was essential to research rules of typography and color and shape theory for business cards, in order to prepare templates and non-disturbing web design. The final website was based on other business cards generators and editors. This made sure the implemented website Business Cards Creator is intuitive to use, because it uses elements that are common among business cards generators. Business Cards Creator features a range of options that were not common in other business cards generators. For example the user can fully customize their selected template or they can make their own design depending on their taste. The selected template can be changed into another one in the process of making the business card. User can upload a logo or an image onto the card. There is an option to export the business card into a PDF file with crop marks.

Business Cards Creator uses principles of user interface to provide the most enjoyable experience. The website's functionality and usability was tested on real users. Users remarks were looked into and implemented. The Business Cards Creator can be further developed and improved with more features such as providing an option of saving the business card's layout into a Cloud or Dropbox account or add the ability to customize the back of the card.

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Appendix A

Usability Test

1. Choose a template.

2. Change size, color, and typeface of any text element.

3. Add bold or italic or underline styling to any text element.

4. Add any shape element. Add a border and style it to your liking. Move the shape element to the back of the business card.

5. Add a new text element and add an image to the card.

6. Remove any element from the card.

7. Zoom in an out of the business card.

8. Export the final card into a PDF.

Appendix B

Questionnaire

About you
1. What is your gender?   ☐ man   ☐ woman
2. What age category do you belong to?   ☐ 1-20   ☐ 21-30   ☐ 30+
3. How often do you use a computer?

    ☐ almost everyday   ☐ 3-4 a week   ☐ 1-2 a week   ☐ less than 1 a week

4. Have you ever used a graphic editors?   ☐ yes   ☐ no
     4.a. Have you ever used a business card editor?   ☐ yes   ☐ no

BUSINESS CARDS GENERATOR
User Interface, Design
1. Overall impression?   very bad ☐   ☐   ☐   ☐   ☐ very good
2. How do you like used colors?   very bad ☐   ☐   ☐   ☐   ☐ very good
3. Is used typeface easily readable?   very bad ☐   ☐   ☐   ☐   ☐ very good

Layout Logic
1. Items in left menu are logically structured: I strongly disagree ☐   ☐   ☐   ☐   ☐ I strongly agree
2. Items in top edit menu are logically structured: I strongly disagree ☐   ☐   ☐   ☐   ☐ I strongly agree
3. Items in bottom menu are logically structured: I strongly disagree ☐   ☐   ☐   ☐   ☐ I strongly agree

Other questions
1. Have you had trouble understanding some button/s functionality?
    If yes, please describe:

_____

_____

_____

2. What did you like?

_____

_____

_____

3. What you didn't you like on the website?

_____

_____

_____

3. What is missing on the website?

_____

_____

_____