1   CREATION OF WEBSITES

Websites are used for various purposes and are suitable for a wide range of applications in practice. They make it possible to present information online. In today's digital age, they are an important tool for communication, business and e-commerce, education, and entertainment. Websites can serve as educational platforms providing information, courses, and educational materials online. Many websites allow users to interact with each other through chat, comments, and other tools. Individuals can thus spread information among themselves, including through their own portfolios and blogs. For businesses, websites are an essential element of their presence in the digital world. They use them as a key tool for digital marketing and self-promotion, for brand building, or communication with customers. Websites provide contact information for the business and allow potential customers to find more information about the services and products of the business, as well as direct sales through electronic stores.

1.1 Defining a website and keywords

A website is an electronic document containing various data and information that is presented on the website in an aesthetic and readable manner. A website consists of a collection of files that can contain text, links, images, videos and other interactive and (multi)media elements.

Depending on the way website content is generated and displayed to website visitors, we can divide websites into:
- **Static websites** – their content is generated exactly according to the source code and remains unchanged throughout the visitor's visit to the website. Static websites are easier to create and host. They are suitable for simple information pages, portfolios, and other presentation websites where the content rarely changes, and which do not require user interaction.
- **Dynamic websites** – their content is generated on demand depending on the request parameters. The content may change dynamically over time due to various facts, which may be the state of the system, the status of the user (e.g. logged in/logged out) or due to other factors. They thus enable the display of personalized content. The creation of dynamic websites is more demanding, and they are also more demanding for hosting. They are suitable for websites that require frequent updating of their content as well as user interaction. Examples of such websites are electronic stores, websites containing various forms, enabling user registration, content management and other functions.

Websites are hosted on servers. **Servers** are computer systems designed to provide content and services over the Internet so that they are accessible to online users. Servers can be in various locations around the world and are connected to the Internet. Sometimes a website is accessible only to selected users (paid content or within a private company network - intranet).

Websites are accessible using web browsers and the Internet. A web browser is software that allows a user to view and interact with web pages. Web browsers translate the code of web pages and display the content of web pages to the user in the form of text, images, videos, buttons, forms, etc. Examples of web browsers are Google Chrome, Mozilla Firefox, Microsoft Edge, Opera, Safari.

Each website has its own unique **address**, for example www.uniag.sk, through which users can access it. The website address contains information about the exact location and path to the given content. It is also referred to as **URL** (Uniform Resource Locator).

In the context of websites, we can distinguish between the terms user and visitor. Although these terms may seem synonymous, it is possible to distinguish them:
- **Website user** – we can understand this term as a broader term that includes all individuals or systems that access the website. This may include administrators, editors, but also visitors and others who have access to the website.
- **Website visitor** – is a specific type of website user who accesses the website as a guest. The visitor views the content of the website without necessarily being logged in or registered on the website.

Websites can be linked to each other - they refer to each other by their address. Referral is implemented through:
- **Hyperlink (or "link" for short)** – is an interactive element that refers to other data (text, web page). Enables navigation on websites. By clicking on it, the user goes from one part of the website to another. A hyperlink can be contained in a text, image, video, etc.
- **Hypertext** – is a text containing a hyperlink (link). The user is allowed to click on the hypertext to move to another part of the website or to another website. Hypertext provides a non-linear way of reading or viewing information.

1.2 Website history

The creation of the first websites was preceded by the creation of the web as one of the services available on the Internet. The **World Wide Web** (WWW or web for short) is one of the key inventions that led to a significant shift in the availability and exchange of information via the Internet. It was created by the British scientist Tim Berners-Lee in 1989 during his work at the research organization CERN (Geneva, Switzerland). The goal was to satisfy the need for information sharing between scientists at universities and institutions around the world. The Web is a system of documents that are interconnected and accessible using web browsers and the Internet. The Web uses hypertext transmission of information and allows users to view and interact with documents online.

Tim Berners-Lee created the **first website in August 1991**. It informed the World Wide Web project. It contained only text with links (hypertext) to other subpages. The images did not begin to be used on websites until the following year.

In 1993, one of the **first modern web browsers**, Mosaic, was created (Fig. 1). It was developed at the National Laboratory for Applied Mathematics and Information Sciences (NCSA - National Centre for Supercomputing Applications) at the University of Illinois. Mosaic was an important milestone in the history of the Internet because it offered access to web pages through a graphical interface, making it easier to use and spread the web among the public. Mosaic allowed users to browse web pages where it could already display text alongside images.
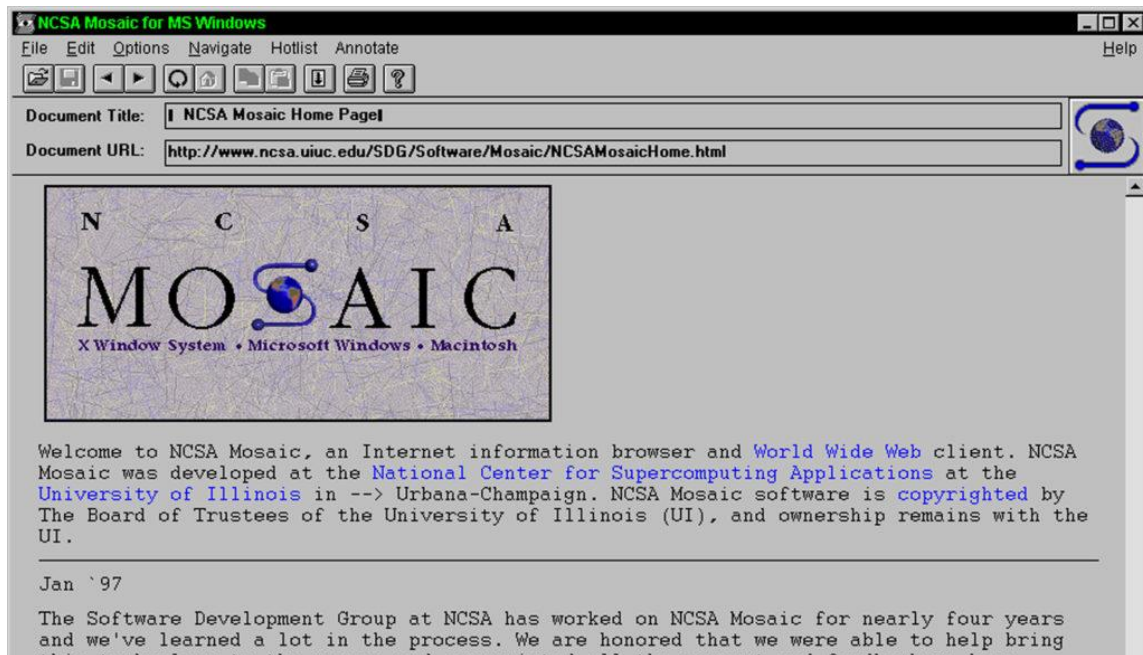
Figure 1 Mosaic web browser[1]

The popularity and number of websites grew rapidly. In 1994, the international organization **World Wide Web Consortium (W3C)** was founded to establish standards and specifications for web technologies (HTML, CSS, XML and others) and coordinate their development. These standards help ensure website consistency across different platforms and browsers. The W3C plays a key role in shaping the future of web technologies and ensuring that they are developed in line with the interests of users and industry.

In 1995, the first online stores and dynamic websites were launched. In their creation, scripting languages (JavaScript) were used, thanks to which an interactive and lively web environment was created. From a technological point of view, the following versions of the website are distinguished:

- **Web 1.0** – covers the period of the first development of the Internet. Websites were static. Website visitors only received content, not created it.
- **Web 2.0** – marks a shift towards more interactive websites and social platforms, the content of which can also be participated by their visitors.

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[1] Source: https://www.ncsa.illinois.edu/wp-content/uploads/2021/10/mosaic.1.0.2-1024x955.jpg

Visitors are allowed to create content, share information, and interact with other users on the website.

- **Web 3.0** – the name semantic web is also used. It is a concept that emphasizes better understanding of information by computers and enables automated processing of data on the web. The goal of the Semantic Web is to enable computers to understand, interpret and analyse data on the Internet in a similar way to humans.

Other interesting moments in the history of the web and websites include:

1994 – launch of Amazon.com online store,
1995 – creation of the first version of the Internet Explorer web browser,
1995 – establishment of the ebay.com auction server,
1998 – founding of Google,
2000 – 20 million web servers are in operation,
2001 – foundation of wikipedia.org,
2003 – launch of Myspace social network,
2004 – creation of the Mozilla Firefox browser,
2004 – launch of the Facebook.com social network,
2005 – launch of YouTube.com,
2008 – creation of the Google Chrome browser.

1.3 Website creation process

Creating a website is a complex process, the complexity of which also depends on the size and scope of the project. The whole process can be divided into individual phases in which different team members fulfil their tasks.

1.3.1 Role in the website development team

Creating websites requires the collaboration of different people with a wide range of skills and expertise. Each member of such a team of people fulfils a specific role. Depending on the size and scope of the project, in some cases a single team member may perform multiple team roles at the same time, while in other cases individual members of a large team may be involved in specific aspects of website development. Team members can be ranked, and their roles specified as follows:

- **Project manager** – ensures the management and coordination of the entire process of creating a website. Responsible for setting goals, their control and planning activities, budget, and time schedule management.
- **Consultant** – provides expert advice to a client who requests the creation of a website. His job is to help the client achieve their goals and website requirements. Mediates communication between the client and other team members.
- **Web designer** – deals with the visual aspect of a website and its user interface. He is responsible for the creation of graphic design, the selection of used colours, the appropriate choice of typography and the layout of individual elements of the website.

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- **Graphic designer** – deals with the creation of graphic elements for the website, which include the logo, icons used on the website, images, and other visual elements. Works with the web designer to create the overall visual style of the website.
- **UX/UI designer** – deals with usability (user experience - UX) and user environment (user interface - UI) of the website. He is responsible for designing and testing the usability of the website and the intuitiveness of its control.
- **Coder and programmer** – responsible for implementing the design and functionality of the website through coding and programming. For this purpose, it uses markup, scripting, and programming languages.
- **Tester** – is responsible for testing the functionality, usability, performance, and security of websites before they are put into operation. His job is to identify errors, flaws, and potential problems in various aspects of the website. The tester gives feedback to the developers to eliminate identified problem areas.
- **Copywriter** – deals with the creation of content for the website. His activities include writing articles, product descriptions and other content elements of the website, mainly of a textual nature.
- **SEO specialist** – s task is to optimize the website to improve its position within the search results of web search engines and thus increase the traffic of the website by visitors.

1.3.2 Steps of the website creation process

The process of creating a website consists of a sequence of several steps that are connected to each other. The whole process can be divided into the following steps:

1. Analysis of client requirements and proposal.
2. Implementation.
3. Testing.
4. Publication of the website.
5. Maintenance, content editing.

In the following subsections, the individual steps of the website creation process are described in more detail.

1.4 Analysis of client requirements and website design

Analysing the client's requirements is the first and fundamental step in the website creation process. As part of this step, it is necessary to establish answers to questions that are important to ask yourself before starting to create a website. These answers subsequently influence the entire further process of creating a website.

In the first step of the website creation process, it is determined for what purpose the website is being created. Thus, answers to the following questions, for example, are sought:
- What is the purpose of the website?

- What are the needs of its users?
- Who is the target group of visitors for whom the website is being created?
- Administration of website content via the admin interface is required.
- What are the website content requirements?
- What functions should the website have?
- What should be the structure of the website?
- What different subpages should the website contain?

Finally, it is necessary to set a budget for the creation of the website and in what time the website should be created.

After answering the above questions, it is possible to continue their analysis and processing, as well as to start designing and creating other materials that will become the basis for further steps in the process of creating websites. Such documents include:
- technical specification of the product - website,
- wireframe-y.

1.4.1 Website technical specification

A website technical specification is a document that details the requirements and technical aspects of a website. The technical specification contains all the necessary information for the creation of a website; therefore, it is an important document for website creators. Contains information about:
- **technological requirements –** they describe what markup and programming languages should be used, whether an editorial system should be used and what kind, what database should be used and what other tools,
- **architecture** – defines the list and description of individual subpages of the entire website, the structure of folders and files, database schemas,
- **functions** – contains a detailed description of the functions that the website should fulfil/provide (for example search, navigation, forms, etc.) and the technical requirements for the implementation of these functions,
- **design and layout of elements** – contains information about the design of the website, the colours used, the typography, the logo, navigation, the layout of the elements on the website and their adaptation to the device on which the website is viewed,
- **safety** – defines what security measures should be used on the website to prevent hacker attacks, protection against spam, etc.,
- **optimization and performance** – contain requirements for optimizing a website for search engines, as well as requirements for website performance (fast loading, smooth running),
- **maintenance** – describes the method of support and maintenance of the website after its commissioning, its backup, error corrections.

1.4.2 Wireframe

A wireframe is a simplified graphical version of a web page. It is a sketch that is used to visualize the structure, layout of content, layout of website elements (Figure 2). This is only a rough sketch without detailed graphic processing. It is used to visualize and plan a website before developing and designing it. It also serves as a basis for graphics.
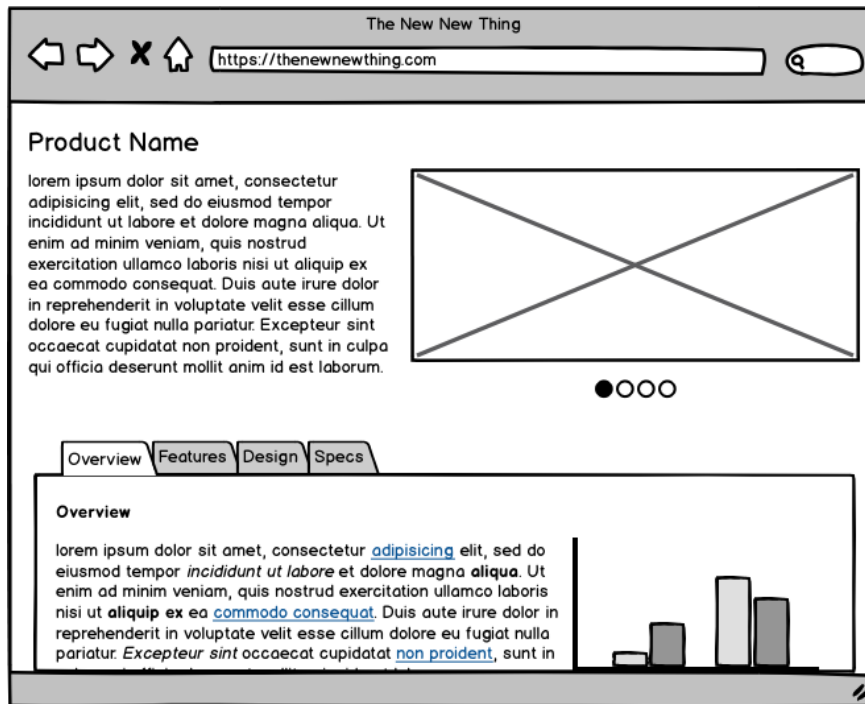

Figure 2 Sample wireframe[2]

A web page wireframe is usually composed of simple geometric shapes that represent the individual elements of the web page and their location, size, and spacing/distance between them. These shapes can represent parts of a web page such as a header, footer, or menu, image, video, button, and more. It is also possible to add texts and descriptions to the elements for the visualization of these elements of the website. Wireframes are usually black and white, they don't contain any colours yet, they don't define fonts or any graphics. This is intentional, as the purpose of a wireframe is to focus on the structure of the page.

Thanks to wireframes, there is a clear idea of the website's structure from the very beginning of its creation and enables quick modifications before its actual development. It thus improves communication between the creator of the website and the client for whom the website is being created. Thanks to the wireframe, the client can better imagine how his website will look and function. Already in the early stages, it is possible to identify problems with the layout and functionality of the website and

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[2] Source: https://balsamiq.com/assets/tutorials/articles/final_mockup.png

to test different layout variants. Ultimately, a wireframe helps ensure that the website you create is well organized and provides a good user experience.

1.5 Implementation

After analysing the requirements, creating the design of the website and the technical specification, it is possible to proceed to the creation of the website. The documents created from the previous step will serve as the basis for implementation.

When creating a website design, it is important to consider the correct choice of colours used, so that they have sufficient contrast and that the colours that characterize the given company are used. At the same time, website graphics are created, which consist of logos, images, icons, and other visual elements that make up the appearance of the website. At this stage, the type of font that will be used on the website is also chosen. Equally important is the creation of content that brings the visitor to the website and keeps the visitor on the website.

When creating a website design, a clear and intuitive layout of website elements is chosen. Consistency and integrity of design should be maintained across the entire website on each of its subpages. In modern websites, the layout of the website elements adapts to the screen of the device on which the website is viewed. Today, most of the website traffic comes from mobile devices such as smartphones and tablets, which have smaller screens than computer monitors. For this reason, to ensure the convenience of viewing the website for visitors, it is necessary that the display adapt to this fact. Therefore, the website builder should ensure that the website has a responsive design. **Responsiveness** makes it possible to recognize the parameters (screen size) of the device (computer, tablet, smartphone) on which the web page is displayed and adapt the layout of its elements to it, so that the page is as easy to use as possible. Advantages of responsive design:
- More convenient viewing (layout of elements, size of text, images...).
- Clearer control (simple menu navigation).
- Adapted for finger control (size of space for touch).
- Fewer elements and reduced content.

There are several options that can be used to create a website. We can categorize them into 3 main ways:
- writing code,
- using the editorial system for managing the content of the website,
- using an online service.

1.5.1 Creating a website by writing code

Creating a website by writing code allows you to create a website that is precisely tailored and modified to the greatest possible detail. This way of creating a website involves coding and programming the website. Website coding and programming is the process of creating the source code that forms the structure, design, and

functionality of a website. It is a key step in the website creation process. In this step, by writing code from the website design that was created in the previous step of the creation process, a real website is already created. The code defines the structure of the website, the elements that are used on the website, the functions of the website, what colours are used, the font type and its format. The code also contains the texts that are displayed on the website, including information about the display of images, logos, videos and other graphic or multimedia elements of the website. These consist of separate files that are placed in the file structure of the web page and referenced from the code.

Creating a website by writing code takes place using a **text editor** or development **environment**. Text editors or development environments provide creators with various options and functions for writing and editing code, as well as integration with other tools necessary for creation. These functions help creators in creating code in various ways - they highlight the code in colour, check for errors, complete the code, automatically format it, etc. A web browser is used to test the created website.

Various markup, scripting and programming languages are used for coding and programming websites. Code generation is divided into two main parts:

- **Frontend** – is the part of a website that is displayed and interacts directly with the visitor. The languages HTML, CSS, and JavaScript are used for the creation of the frontend.
- **Backend** – is the part of the website that is responsible for calculations and operations in the background of the website - data processing, communication with the database, processing of requests from the front end, etc. Languages such as PHP, Python, Java, Ruby are used.

The following lines describe the basic languages that are most often used when creating websites.

1.5.2 Creation of a website using an editorial system for website content management

The use of an editorial system for managing the content of a website (Content Management System, CMS) is a suitable way of creating websites for creators without technical knowledge, for example of the already mentioned markup or scripting languages. The editorial systems thus make it possible to create websites without the need to write code, also thanks to the fact that they have a graphical administrator interface (Figure 3). Through the admin interface, the website creator can create, manage, and edit the content of the website. The appearance of the website is largely influenced by the theme (template) that the creator chooses and whose appearance he can customize. Editorial systems make it possible to create dynamic websites, including the possibility of registering visitors, generating content, or using various other functions, such as forms, calendars, image presentations, and the like. If you need to use a function that the editorial system does not have in the basic version, it is usually possible to add such a function to the website by installing a suitable add-on.

There are several editorial systems. Among the most famous are WordPress, Joomla, Drupal, Magento, Shopify and others. Choosing a suitable editorial system for creating a website also depends on the focus of the website. Another editorial system is suitable for creating a blog-type website and another for creating an electronic store. Therefore, it is important to correctly choose an editorial system that meets the requirements for the website being created.
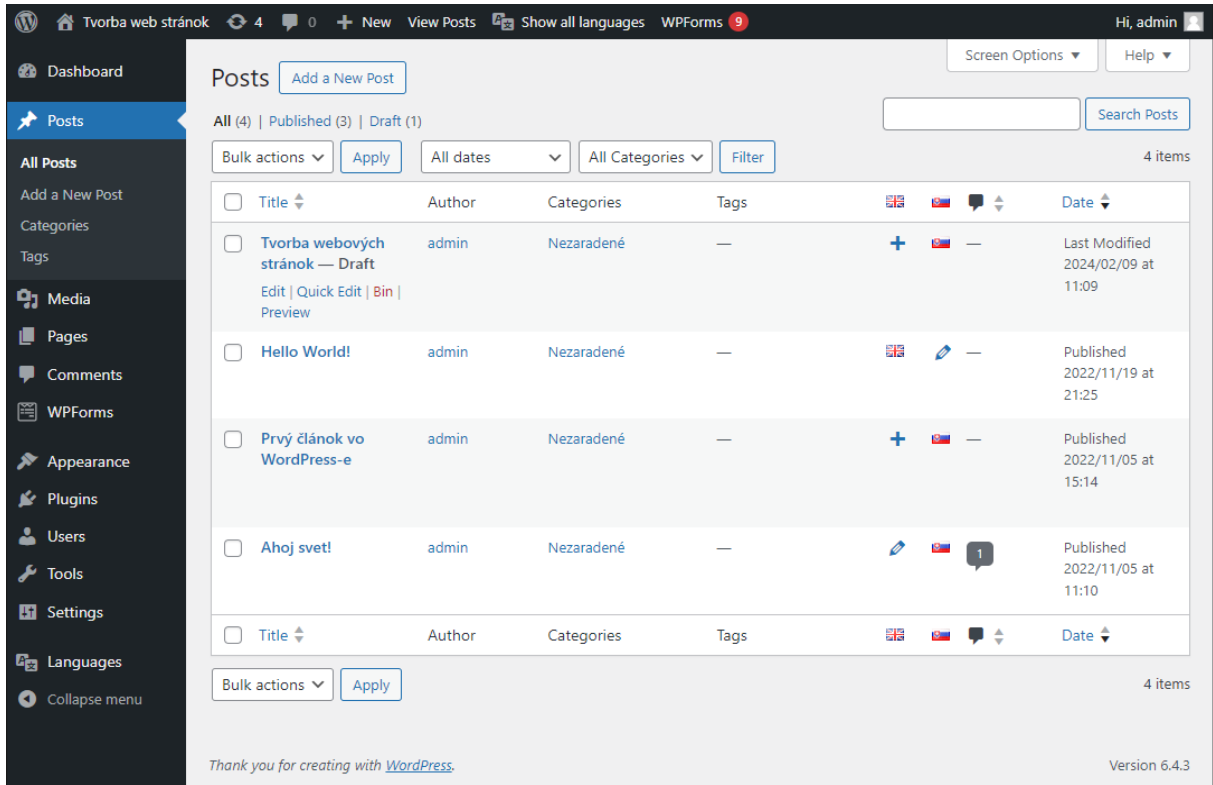
Figure 3 A sample of the WordPress CMS admin interface

1.5.3 Creation of a website using an online service

Creating a website using an online service is the easiest way to create a website. This method is a quick way to create a website. As with the creation of a website with the use of editorial systems, in this case too, the creator of the website does not need to have any knowledge of the languages used in the creation of websites by writing code. A website builder can use any of the many online services that provide easy website creation. These services provide various features and tools for creating websites through a graphical interface and ready-made templates.

The user of such an online service usually chooses one of the available templates offered by the given online service/platform. In this way, he will receive an essentially ready-made website, which he can adapt to his needs and insert his content into. Editing of the website takes place through the graphical interface and the editor located in it. The possibilities of customizing the appearance of the website created in this way, as well as the use of various functions on the website, are limited. It is necessary to adapt to what is provided by the chosen online service through which the

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website is created. These online services often offer a free version with limited options, or with the display of advertisements on the website, or a paid version with a more extensive group of setting options, or without displaying ads on the website being created.

1.6 Website testing

An important step before publishing a website is to test it. Testing plays an important role in verifying and confirming that a website is functional, secure and provides a good user experience. With website testing, it is possible to discover and fix its flaws, errors, improve performance and ensure that the website works as it should. Testing is performed by testers or can also be done using tools designed for this purpose.

Website testing can be done from different points of view, and testing can be divided into:

- **Functionality testing** – verifies that all website functions are working properly. This testing includes various website usage scenarios, such as logging in, submitting a form, purchasing a product, etc., as well as testing the functionality of links, menus, and other interactive elements.
- **Usability testing -** it is determined whether the website is sufficiently intuitive, whether it is easy to use and whether users know how to work with the given website. As part of this testing, user feedback is also collected.
- **Responsiveness testing -** focuses on verifying whether the website is responsive and whether it is displayed correctly on different screens of different devices (smartphone, tablet, monitor).
- **Security testing** – helps identify security vulnerabilities on a website. The goal is to ensure the protection of data and the entire site against attacks.
- **Performance testing -** the loading speed of the website is tested, as well as the response speed to various actions that can be performed on the website.
- **Compatibility testing -** it is verified whether the website works and whether it is displayed correctly on different web browsers and on different devices (computer, smartphone, tablet).

Website testing is important not only before publishing a website on the web. Testing regularly continues to play an important role throughout the lifetime of the website to maintain the functionality, security, and usability of the website.

1.7 Publishing a website on the web

Once the website is built and tested, it can be made available to users. For users to be able to access it over the Internet and view it through a web browser, it is necessary to register a domain and provide hosting for the website.

A **domain** is a text label for a website address on the Internet. It usually consists of specific words that describe the content and focus of the website. A domain refers to a place on the Internet (specifically on a server) where a website is stored. An example

of a domain is uniag.sk. The domain must be unique for each website. No two websites can have the same domain (address). The entire address of the website along with the protocol is referred to as URL (Uniform Resource Locator). An example of a URL is *https://www.uniag.sk/en/main-page*.

Hosting is a service of providing space on a server that is connected to the Internet. This service can be rented from one of the hosting providers. Hosting companies manage servers and ensure their functionality and accessibility via the Internet. After securing the hosting for the website, it is possible to upload all the files and data that the website consists of to the server.

Once the domain is registered and hosting is secured, the website can be accessed via a web browser either by searching for the website through a search engine (Google, Bing, Yahoo, etc.) or by entering the URL of the website into a web browser (Google Chrome, Mozilla Firefox, Microsoft Edge, Safari, etc.). The URL has the following structure: *http://www.domain-name.sk/web-content/file.html*, while its individual parts mean:

- **http** (Hypertext Transfer Protocol) – is a protocol that makes it possible to display web pages. It is used to transfer data over the Internet. The *https* protocol is used for a secure/encrypted connection (Hypertext Transfer Protocol Secure).
- **www** (World Wide Web) – is a designation for a set of web pages accessible via the Internet. The abbreviation web is also used. In the website address, www indicates that it is a website accessible via the Internet.
- **domain-name.sk** – represents the domain that has been registered for the website. There are several levels of domains - they are separated by dots in the address:
  - **first level domains = TLD (Top Level Domain)**
    - generic: .com, .edu, .org,
    - national: .sk, .cz, .eu,
  - **second level domains**
    - for example: uniag.sk,
  - **third-level domains**
    - for example: fem.uniag.sk.
- **file path**, for example: /web-content/file.html – represents path information to a subpage or file within the directory structure. Each directory is separated by a slash (/).

Publishing a website on the Internet does not end the process of creating and managing a website. The website still needs to be maintained and optimized to serve its purpose.

1.8 Website optimization for search engines

Optimizing a website for search engines (Search Engine Optimization, SEO) is a process that helps a website in its searchability by search engines such as Google, Bing, Yahoo, etc. The goal is to achieve the best possible placement of the website in

the search results. Proper optimization of a website for search engines can thus lead to an increase in organic website traffic.

Optimizing a website for search engines is a long-term process. It includes various website modifications that can help the website to be better indexed and evaluated by search engine robots. Search engine robots crawl the content of the website, collect data about the website, process it, evaluate it and store it in their databases, so that the search engines can then quickly provide relevant search results to the user's query.

As part of optimizing a website for search engines, it is recommended to implement various procedures with the website that can help it to be better found. We are not talking about exact rules, but only recommendations. These recommendations include focusing on the creation of high-quality, valuable, original, interesting content. The content should be clear and easy to read. It is recommended to use appropriate headings, focus on metadata, and appropriate selection of keywords. Backlinks from other websites are also beneficial. In the case of CMS, it is possible to use suitable extensions that help SEO. Search engines give a positive evaluation even if the website is "friendly for mobile devices" - i.e. the website has a responsive design. There are other SEO trends that need to be continuously monitored and applied on the website.

1.9 Website maintenance and editing

Publishing a website on the web does not end its life cycle. The website still needs to be managed, edited, and updated. New content may continue to be added to the website or existing content may be modified to ensure that the website is always up to date. The technologies used on the website also evolve over time. These are also recommended to be updated regularly so that the website is properly functional and secure. SEO optimization is also not just a one-time thing, but it is necessary to work on the optimization of the website constantly so that it is searchable by search engines. It is necessary to regularly check the website traffic with analytical tools and adapt the website according to the results. The same applies to measuring website performance and maintaining its performance. Regular website backups are equally important as the best prevention against data loss in the event of a website failure or a website attack.

Regular maintenance and editing of the website are essential to maintain its relevance, security, and success. Keeping up with the latest trends and best approaches to online marketing and content strategy can also help improve website success.