

## MODERN APPROACHES AND TOOLS FOR CREATING INTERACTIVE WEB DESIGN

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### **Introduction**

In the modern digital world web design plays a key role in creating user-friendly, functional, and attractive user interfaces. However, standard static solutions are no longer sufficient — users expect interactivity, personalization, and instant feedback. Interactive web design allows for the creation of dynamic interfaces that adapt to user behavior, increasing engagement and improving the user experience. This approach is actively used in web development, mobile applications, the gaming industry, and other areas where it is important to create not only visually appealing but also intuitively understandable products. This article discusses modern methods and tools for developing interactive web design, their features, and their impact on creating convenient and effective digital products.

Interactive web design is a methodology aimed at creating user interfaces that promote user engagement and participation in the interaction process with a product or service. The main goal of interactive design is to provide users with the ability to actively influence the interface and receive real-time feedback.

Interactive design is an important component of web development, mobile applications, the gaming industry, and other areas where it is essential to create an attractive and user-friendly interface. It also plays a key role in creating a unique user experience and establishing an emotional connection between the user and the product.

An important feature of interactive design is its focus on user behavior, needs, and expectations. To achieve this goal, various technologies, methods, and tools are used to create an attractive, intuitive, and easy-to-use interface.

In some cases, interactive design is equated with interaction design; however, there are clear distinctions in the specialized study of these disciplines. To differentiate them, interaction design can be viewed as:

Creating devices that are convenient, useful, and interesting, with an emphasis on the efficiency and intuitiveness of hardware. A combination of industrial design, computer science, and communication design.

The process of solving specific problems in certain contextual conditions.

Forming the behavior of products, services, environments, and systems. Simplifying the interaction between the user and technology, reducing barriers in communication.

Connecting people through various products and services. While interactive design can be seen as:

Giving meaning to interaction design through the creation of a meaningful user experience.

A system of six core components: user control, responsiveness, real-time interaction, connectivity, personalization, and gamification.

Focusing on the use and user experience of software.

Ensuring quick access and processing of information on demand.

Transforming information through interaction.

Dynamically changing information and media regardless of device changes.

Ensuring interactivity considering the capabilities and limitations of human perception.

Although both directions are user-oriented, the key difference lies in their goals: interactive design focuses on creating interactive products and services, while interaction design focuses on designing these products and services. Interaction design without interactive design remains just a concept, while interactive design without interaction design can lead to products that are not user-friendly.

The main task of interactive design is to help users navigate the application by illustrating the relationship between the elements of the user interface. Designing usable Web sites requires more attention to context than designing usable GUIs. [2] Interactive design also has the ability to add character to the application with animated icons, logos, and illustrations; however, usability should take precedence over expressive elements.

Key methods for developing interactive web design

#### 1. Prototyping and iterative design

Prototyping:

Creating rough sketches and interactive prototypes allows visualizing the concept and testing user interaction at early stages of development. Tools like Figma, Sketch, and Adobe XD are actively used for this purpose.

Iterative approach:

Repeating cycles of development, testing, and refinement help adapt the design to the real needs of users. Each iteration allows gathering feedback, eliminating shortcomings, and improving the interface.

#### 2. User-Centered Design (UCD)

User experience is a concept which is frequently discussed but not easy to define. [1]User-Centered Design (UCD) is an iterative development process where designers focus on users and their needs at every stage. Within UCD, design teams actively involve users at all stages of design, using various research and development methods to create products that are as convenient and accessible as possible.

User-Centered Design (UCD) represents an iterative process. Within UCD, designers use a combination of research methods and tools (e.g., surveys and interviews) as well as generative approaches (e.g., brainstorming) to gain a deeper understanding of user needs.

The term User-Centered Design emerged in the 1970s. It was later actively developed by Don Norman, an expert in cognitive science and user experience, who dedicated a significant part of his work to improving the interaction between people and various products. Thanks to his books, such as *User Centered System Design: New Perspectives on Human-Computer Interaction* (co-authored with Stephen Draper) and *The Design of Everyday Things* (originally published as *The Psychology of Everyday Things*), the concept of UCD gained wide recognition and acceptance.

4 stages of User-Centered Design (UCD). Typically, each iteration of the UCD approach includes four main stages:

Understanding the context of use. At the first stage, the design team seeks to understand the context in which users will interact with the system or product. User behavior, conditions of use, goals, and tasks are studied.

Defining and specifying user requirements.

Then the team identifies specific needs and requirements of users that the product must consider and satisfy. This helps focus the design on solving real user problems.

Developing solutions (Design). At this stage, the team develops and proposes solutions, creating prototypes or mockups that embody the collected requirements and take into account the context of use.

Evaluating solutions (Testing and validation)

The team assesses how well the developed solutions meet user needs and the context of use. Testing is conducted to understand how well the design works, how effective it is, how user-friendly it is, and how well it meets user expectations.

After evaluation, the team returns to the beginning and repeats the cycle, making necessary improvements. Iterations continue until evaluation results show that the design fully meets user requirements.

In User-Centered Design (UCD), the foundation of work is a clear understanding of users, their tasks, and the conditions in which they interact with the product. The goal of the process is to encompass and improve the entire user experience. Therefore, the design development team should include specialists from various fields: ethnographers, psychologists, software and hardware engineers, as well as experts in specific areas, stakeholders, and users themselves.

Experts can evaluate developed solutions based on design guidelines and quality criteria. However, it is important to remember two key points:

To encompass the entire user experience, it is necessary to involve users themselves at the evaluation stage.

Long-term observation of how the product is used is required to ensure its effectiveness and alignment with user expectations over time. Investments in UCD are justified when the design team involves users at every stage of the design process, they invest their efforts and resources in a powerful tool that allows them to understand what works well, what does not, and why. Users become a kind of early warning system, helping to adjust the course and refine the design to the desired level. They can identify both positive and negative aspects of the product that the team might have overlooked—especially in such important areas as usability and accessibility. That is why it is important to understand how significant the advantages of a user-centered approach are.

"Human-centeredness requires additional costs for any project, so businesses understandably ask the question: is it worth spending so much time talking to people, creating prototypes, and so on? The answer is a resounding 'yes.'" — David Benyon, a professor with over 25 years of experience in HCI (Human-Computer Interaction)

David Benyon highlights four reasons why investments in UCD are justified:

Products better meet user expectations and requirements, leading to increased sales and reduced customer service costs.

Designers develop solutions considering specific tasks and contexts of use, reducing the likelihood of errors caused by human factors. This makes the product safer. Close interaction with users develops empathy in designers. This is the foundation for creating ethical solutions that respect user privacy and quality of life.

Focusing on user diversity allows for cultural differences and human values to be taken into account. This approach helps businesses move towards sustainable development and the creation of socially responsible products.

We can say some words about Agile methodologies. Agile Methods are a reaction to traditional ways of developing software and acknowledge the “need for an alternative to documentation driven, heavyweight software development processes”.[4]Flexible development methodologies allow organizing work in small cross-functional teams, quickly responding to changes and releasing updates in short sprints.

Continuous integration and feedback:

Regularly obtaining feedback from users and stakeholders helps quickly adjust the course of development.

Responsive web design (Responsive Web Design, RWD) is an approach to web design aimed at ensuring that web pages are displayed correctly on all screen sizes and resolutions while providing good usability. Adaptive and responsive designs often attempt to achieve 'balanced' or representative samples during data collection; balanced samples match the population distribution on one or more dimensions, such as sex or age.[3]It is a way of designing for a multi-platform web.

The predecessor of responsive design: mobile web design. Before responsive web design (Responsive Web Design, RWD) became the standard approach for ensuring correct website display on different types of devices, developers often spoke of mobile web design, mobile web development, or design friendly to mobile devices. These approaches pursued the same goals as responsive design: to ensure that websites worked correctly on devices with various screen characteristics (screen size, resolution) in terms of layout, content (text and media), and performance.

The differences lay in the devices and technologies that were available at that time to implement solutions.

Earlier, there was talk of desktops and mobile phones, but now there are many types of devices: desktop computers, laptops, smartphones, tablets, smartwatches, and others. Instead of developing sites for several fixed screen sizes, it is now necessary to create solutions that will universally work on any known and unknown devices.

Previously, mobile devices were limited in processing power and graphics, had low internet connection speeds. Some of them did not support CSS or even HTML, so server-side device detection (browser sniffing) was often used to determine the type of browser or device and deliver the most simplified version of the site. Mobile users were often offered very simple and stripped-down versions of sites, as the devices could not handle anything more complex.

Today, mobile devices are capable of processing the same technologies as desktop computers, so approaches like server-side device detection are used less frequently.

Nevertheless, it is still worth applying responsive design approaches to ensure users have a comfortable experience on mobile devices, considering such limitations as battery life and limited bandwidth.

User experience remains important. Mobile users, for example, on an airline's website, are likely to want to quickly check flight times or delays rather than watch 3D animations of routes or explore the company's history. This is easily implemented through responsive design techniques. User-centered webpage design can be applied to create websites for older adult users [5]

Essentials of responsive web design. HTML is inherently responsive or flexible by nature. If you create a page using only HTML without CSS and resize the browser window, the text automatically reformats to fit the width of the viewport.

However, the standard behavior of the browser is not enough. For example, lines of text stretched across the entire width of a wide screen are difficult to read. If you use CSS to limit the length of lines by adding columns or margins, the site will look cramped on a narrow screen. This is why responsive design emerged, which ensures optimal content display on any devices and screens.

Creating a web page with a fixed width that does not change when the window size is altered is also not a solution; this leads to horizontal scroll bars on narrow devices and a lot of empty space on wide screens.

Responsive web design (Responsive Web Design, RWD) is an approach to design that takes into account the diversity of devices and their sizes, ensuring automatic adaptation of content to the screen, regardless of whether it is viewed on a tablet, phone, TV, or smartwatch.

Responsive web design is not a separate technology but rather an approach. This term describes a set of best practices applied to create layouts that can adapt to any device used to view content.

The term responsive design was introduced by Ethan Marcotte in 2010. He described the use of fluid grids, fluid images, and media queries to create responsive content. At that time, it was

recommended to use the CSS property float to build layouts, as well as media queries to track the width of the browser window and create layouts for different breakpoints. Fluid images were adjusted not to exceed the width of their container: they were set with the property max-width: 100%. Such images shrink when the column container narrows but do not exceed their original width when it expands. This allows the image to shrink to fit its container without going beyond its limits and not becoming blurry when enlarged if the container becomes wider than the original image size.

Modern CSS layout methods inherently support responsiveness, and since Marcotte's article was published, many features have been added to the web platform that facilitate the development of responsive sites.

**Conclusion.** Interactive web design is not just a trend, but an important tool shaping the future of digital interaction. The application of prototyping methods, user-centered design (UCD) approaches, agile development methodologies, and adaptive design allows for the creation of interfaces that not only attract attention but also make interaction with the product convenient and intuitive. The use of modern tools such as Figma, Adobe XD, CSS Grid, Flexbox, and media queries helps designers and developers create adaptive and responsive interfaces that take into account the needs of various devices and users. The future of web design lies in creating intelligent and adaptive interfaces that will anticipate user needs, providing seamless and enjoyable interaction with digital products.

### References

1. Social commerce website design, perceived value and loyalty behavior intentions: The moderating roles of gender, age and frequency of use. [Электронный ресурс] Режим доступа: <https://www.sciencedirect.com/science/article/abs/pii/S0969698920314120>
2. An Introduction to Agile Methods. DAVID COHEN, MIKAEL LINDVALL, AND PATRICIA COSTA. <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=d6672ea75d2c1f8a2cb9f958d09eb4828fe8527f>
3. Adaptive and Responsive Survey Designs: A Review and Assessment  
<https://academic.oup.com/jrssa/article/180/1/203/7068189>
4. Shaping Web Usability: Interaction Design in Context. [Electronic resource] Access mode: <https://dl.acm.org/doi/fullHtml/10.1145/763909.763910>
5. Affective psychology and color display of interactive website design. [Electronic resource] Access mode: <https://www.sciencedirect.com/science/article/abs/pii/S0141938221001347>