

THE EVOLUTION OF DESIGN SYSTEMS AND UI/UX TECHNIQUES

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Abstract. *Software companies have been striving to develop products that are rapid, high-quality, and consistent since their early days. As user experience design and usability became increasingly important, they started looking for ways to make design scalable and repeatable. Over the years, they have invented terms such as pattern and design libraries, style guides, simple conventions between developers and designers with code snippets, and design tokens. These efforts led to the creation of the design system cross-point paradigm, which has been applied through various prototyping instruments. Design systems and prototyping tools have become an integral part of the design process, helping designers create better products in less time. With their help, designers and front-end developers can maintain consistency across different platforms and products, which is crucial for building robust software. Prototyping tools allow designers to quickly test their ideas and get feedback from stakeholders, which helps them to iterate and improve their designs. Design systems and prototyping tools have revolutionized the way designers work, making it easier and more efficient to create high-quality designs. They have undergone significant evolution in recent years, resulting in changes in UI/UX techniques, with new methods and approaches while building interfaces. This paper discusses the current and future state of design systems, highlighting changes in related UI/UX techniques and outlining their future perspectives.*

Key words: Design System, Style Guides, Design Tokens, Styles, Variables, Modes, Prototyping Tools, UI/UX Techniques, Figma, AI, WCAG 2.2, WCAG 3.0.

Introduction

Technology leaders like Apple, Google, IBM, Microsoft, and Salesforce utilize design systems to standardize and scale their design efforts across organizations. However, this doesn't mean design systems are exclusive to large companies. Today, many businesses, regardless of size,

either develop their own design systems or adopt existing ones to streamline their design processes [1].

Design solutions require several steps: prototyping, user validation, stakeholder approval, translation into code, and UX/UI testing against existing designs. Any redundancy in this process can lead to wasted time, workforce, and money. Using design system, as a central repository to reference designers and front-end developers, can avoid repeatedly solving the same problems and recreating existing solutions.

Design systems in nutshell

Design systems include a visual style, comprehensive documentation, and code snippets. With them, we can quickly copy and paste components from a library to build a new page or screen [3]. In summary, design tools, code fragments, and descriptions of UI elements integrated into a design system enable products to be developed more efficiently and cohesively. Thus, a **design system bridges user experience, front-end development, and visual design**.

There are a lot of reasons why they help product's teams to build more quality software and improve efficiency [2, 9]:

- They are becoming more common because they reduce design and implementation time;
- Designers and developers can build components once and reuse them for all new features afterwards;
- Relying solely on a style guide is not effective. We need to clearly define the main design principles and how they will be implemented, along with documentation that includes code snippets for each component and block. This may require additional communication with the front-end team;
- It's important to establish one source of truth for everyone involved. This approach can be extrapolated across all teams and will lead to a faster onboarding period.

A design system is an ever-evolving framework that enables us to build products more efficiently, with higher quality and at a faster pace. The documentation aspect of it presents an excellent opportunity to streamline the recording of software design language, especially now that our system has reached a new level of maturity. One well-known statistic [2]

demonstrates the importance of using design systems in our daily work. They can increase software quality ratings from 66% to 78% and free up 45% of productive work time, allowing us to deliver even more value.

A design system operates as part of a network of interconnected parts. Similar to an ecosystem, altering one element can initiate a series of consequences. There are several **benefits** to utilizing a design system [4, 5, 6]:

- Time savings for existing team members who would otherwise spend time onboarding new hires;
- Reduced design and technical debt that can accumulate when products are aligned retrospectively;
- Clearer requirements for people managers and operational support and consideration of the number of teams involved in the overall assessment.
- Each team member knows which component or template to choose when creating a new screen and understands how it will function.

Like any ecosystem, altering one variable can trigger a cascade of effects, which may include **negative consequences**:

- Bottlenecks in technical operations and processes, governance, and reporting;
- Time dedicated to building and managing the design system, and education, penetration, and adoption.

Business requirements are pushing designers to create more work, and do so at a faster pace and with higher quality. However, without established standards, every new hire adds to the inefficiency of the process. The absence of a Design system means that each new teammate and every new project contributes to increased chaos, ultimately slowing down progress.

The most outstanding design systems for 2024 year

A design system helps teams maintain consistency and address complex UX/UI challenges, which is why many large companies develop their own. Recently, there has been a strong emphasis on accessibility principles, with many companies adhering to at least WCAG 2.2 and preparing for the upcoming 3.0 version. They are continually working to improve their design systems and integrate AI tools [10, 12, 15, 16]. Here is a list of the

most well-known design systems for the year 2024 [19].

1. Carbon IBM Design System: <https://carbondesignsystem.com/>;
2. Google Material Design: <https://m3.material.io/>;
3. Apple Human Interface Guidelines: <https://developer.apple.com/design/human-interface-guidelines>;
4. Microsoft Fluent Design System: <https://fluent2.microsoft.design/>;
5. Design System: <https://www.lightningdesignsystem.com/>;
6. Atomic Design System: <https://atomicdesign.bradfrost.com/chapter-2/>;
7. Atlassian Design System: <https://atlassian.design/>;
8. Adobe Spectrum 2: <https://s2.spectrum.adobe.com/>;
9. Pajamas Design System: <https://design.gitlab.com/>;
10. Shopify’s design system (Polaris): <https://polaris.shopify.com/>.

All of them are evolving at an unprecedented pace. What started as a way to maintain consistency across digital products has now become central to product development in 2024 and will continue to have a significant impact in 2025. As companies increasingly prioritize scalability, efficiency, and seamless user experiences, design systems have transformed from simple style guides into a driving force behind innovation [6, 7].

The future of the design systems

Key moments from 2024 shown that tools like Figma offer plugins that utilize AI to recommend design enhancements and automate repetitive tasks. Product teams’ emphasis on the accessibility and the inclusivity and real-time collaboration. They utilized tools like ZeroHeight or Storybook that help to create a centralized hub where updates are instantly visible [8]. What it coming next is:

- *Personalization and context awareness*: design systems will leverage AI and machine learning to create interfaces that dynamically adapt to individual users’ preferences, devices, locations, and even moods. This approach will enhance user engagement by delivering a more tailored experience and is essential to begin collecting

- user data in a manner that respects privacy and complies with regulations such as GDPR and [11] WCAG;
- *Ethical design:* is becoming increasingly important, and design systems will incorporate ethical guidelines to help teams make informed choices about data privacy, user engagement, and digital addiction. To support this initiative, we should develop an ethics checklist for our design process that includes user consent, data transparency, and an assessment of the psychological impact of our design choices;
 - The integration of *3D and mixed reality* is transforming design systems to incorporate 3D elements and mixed-reality environments. This shift will require new skills and tools to create immersive and interactive experiences that go beyond traditional flat screens. Tools like Unity and Spark AR will become increasingly important in this evolving landscape;
 - *More no-code tools that generate code for designers and developers:* the gap between design and development is closing thanks to the rise of no-code and low-code platforms. Designers can now create prototypes that are almost ready for production, reducing their reliance on developers for simpler tasks. Tools like Figma, Webflow, and Framer allow for more efficient prototype creation and continually introduce new improvements.

The current and the future state of the UX/UI design and techniques

In recent years, UX/UI techniques in this design field have significantly advanced and their usage changed the user interaction with software products and services [17]. From the other hand the UX/UI design is turning into a complex and multidisciplinary type integrating elements from psychology, sociology, and neuroscience to create seamless and enjoyable user experiences. Several key milestones have marked its development and tools for that. The introduction of the graphical user interface (GUI) in the 1980s revolutionized how people interact with computers, shifting from text-based commands to visual metaphors. In the 1990s, the rise of the internet presented new challenges and opportunities as designers worked to create intuitive navigation through the vast amount of information available online. The mobile revolution of the 2000s prompted a reevaluation of

design principles for responsive layouts and touch interfaces became commonplace. Recently the digital transformation has removed the human partnership aspect from every product and service. Now, we are reintegrating it in a synthetic manner and beginning to use AI more and more. That stands also for doing different regular UX activities and techniques used in UX design such as:

- Building Personas;
- Creating Journey Maps;
- Conducting user interviews;
- Creating Storyboards and Information Architecture;
- Performing brainstorming and ideation process with applying Design Thinking Method;
- Working with low- and high-fidelity wireframes;
- Performing different types of UX/UI tests (usability, A/B testing, and Analytical testing, Kano analysis, etc.) with tools like Qualtrics, Figma, FigJam, Google forms, Looppanel, Dovetail, EnjoyHQ, Miro, Mural and UserZoom).

In 2025, all listed techniques and tools are still relevant, and new ones are emerging together with the following trends [8, 9]:

- AI and machine learning in UX design;
- Virtual and Augmented Reality: reshaping user interactions;
- The Internet of Things and UX design;
- User-Centric design is and will be the core of the future UX;
- Emotional design and user psychology;
- Accessibility and Inclusive Design;
- The changing role of UX designers;
- Multidisciplinary skill sets and collaboration with AI and Automation;
- Ethical considerations in UX design.

Conclusion

The future of design systems and UI/UX design techniques looks promising and full of potential, particularly with advancements such as AI-driven personalization and immersive virtual reality experiences. However, this power also brings responsibility. UI/UX designers have a duty to shape the digital landscape in ways that benefit both users and society.

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