

EXPLORE MODERN RESPONSIVE WEB DESIGN TECHNIQUES

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Abstract: In the short history of web design development have long been used table web design and fluid web design. Responsive Web Design corresponds to the needs of modern devices. The modern web design uses Flexible Box Layout and Grid Layout. Grid Layout is considered to be the most appropriate technique for full page layouts. Flexbox is ideal for styling components on a page, controlling how groups of elements relate to each other.
Key words: responsive web design, frameworks, flexbox, grid layout, networking.

1. INTRODUCTION

In the early days of World Wide Web (WWW), most websites were built and managed by IT departments. The first websites have belonged to large companies, scientific and government organizations. Today, anyone with basic computer skills can build their own web site. With the help of an online platform, each user quickly gets a web space. Step by step using CMS, it's easy to create a blog and even an online store.

Nowadays, website design has become an industry that is growing. Great web designs have lead some businesses to grow and prosper. The opposite side of a badly built web sites lead to failure. There are some recommended tips for designing a web site: good content layout, simple site navigation, appropriate color scheme, user-friendly design compatible with any devices and visible to any screen resolution.

2. EVOLUTION OF WEB DESIGN

2.1. In the beginning

The beginning of web site creation is related to Tim Berners-Lee. On August 6, 1991 — 27 years ago — he published the world's first website [2]. It started as a global hypertext project, which later became known as the World Wide Web. The first website is a simple text-based page with plain left-aligned block text and blue links on white background (fig.1).

2.2 Developing web design

The web design as we know it was born in 1993 when early browsers began to display images with text. In the coming years is used table-based web design. Table-based layouts created additional design options by providing structure and multi-column layouts. The World Wide Web Consortium, formed in 1994, established Hyper Text Markup Languages (HTML) as the standard. HTML has some limitations and the answer came in 1995 – JavaScript appeared.

The next year was the beginning of flash-based design. It presented more layout and design options beyond HTML. The designer could design any shapes, layouts, animations, interactive effects and use any font. Unfortunately, it wasn't search-friendly and used flash plugin to display web pages. Today, flash interactions are replaced by JavaScript handle events and instead of flash animations are used JavaScript library – jQuery. Around the same time as Flash was introduced Cascading Style Sheets (CSS).

CSS created better web page structure. CSS provides markup that determinates the structure of multiple pages instead of creating new markup for each page. CSS gave designers more creative controls, allowing them to design around the purpose of the site and fine-tune details. The appearance of CSS enabled the construction of websites with table less design. The web page layout could be fixed or limited in percentage. The design that used the percentages is called fluid web design. The liquid page layout does not depend on a screen resolution and is displayed in the same manner on different devices.

2.3 Column grids

With the growing number of mobile devices and the growing use of mobile access to the web, web design is no longer limited to desktop or browser compatibility. There are mobile devices with different sizes and resolutions. It is not possible to have different layouts for devices. Also the design be the same on the tiny screen and computer. The web page layout needs to be changed corresponding to the resolutions of different devices. The first step to improvement began in 2007 with idea of column grids. There were different variants - 8-column, 12-column, 18-column and 24-column grid. The 960 grid system won, and the 12-column division became something designers were using every day. The 960 Grid System is simple and lays out nicely in a 960px-wide window and is achieved a good view in only one browser window size. The 12-column grid is divided into portions that are 60 pixels wide. Each column has

10 pixels of margin on the left and right, which create 20 pixel wide gutters between columns. Fluid 960 grid layout it is based on 960 Grid System [1]. It replaced the fixed-width grid elements with percentage width.

Instead of creating a separate mobile layout, in 2010 Ethan Marcotte proposed that the same content could be used, but in different layouts and designed depending on screen size. This was the birth of Responsive Web Design (RWD).

2.4 Responsive web design and frameworks

A site designed with RWD adapts the layout to the viewing environment by using:

- **viewport meta tag** – it was introduced by HTML5 and controls user's visible area of a web page;
- **grid system** - it uses specific CSS classes to divide web page into columns. Each web content element fits into a certain number of columns in the grid ;
- **media queries** - it is a CSS3 module which allows frontend developer/designers to target specific CSS styles depending upon the display capabilities of a device.

The appearance of RWD led to the creation of responsive frameworks. The framework offers fluid grid with adaptive layout in which every element is resized proportional to container within the CSS without further structure. It standardizes the commonly used elements like forms, navigation, buttons, and to pack them in an easy, reusable way. Today, popular frameworks are Bootstrap and Foundation.

Foundation is an open source project which claims to be the most advanced responsive design framework [4]. Foundation provides a responsive grid and HTML and CSS UI components, templates, and code snippets, including typography, forms, buttons, navigation and other interface components, as well as optional JavaScript extensions. Foundation comes standard with a 940 pixel wide, flexible grid layout. It provides powerful multi-device layouts quickly and easily with the default 12-column. A series of Sass stylesheets implement the various components in the Foundation framework. In two of these components the developer determines the width of the column and the spacing between them. The toolkit is fully responsive to be made for use of different resolutions and types of devices. This adjusts the width of the columns automatically.

The Bootstrap's structure it is similar to Foundation. Bootstrap is an open-source front-end web framework. It contains HTML- and CSS-based design templates for typography, forms, buttons, navigation and other interface components, as well as optional JavaScript extensions [3]. It is modular and consists essentially of a series of *Less stylesheets* that implement the various components of the toolkit. A stylesheet called bootstrap less includes the components stylesheets. Developers can adapt the Bootstrap file itself, selecting the components they wish to use in their project. Bootstrap includes a responsive, mobile first fluid grid system that appropriately scales up to 12 columns with a gutter width 15px on each side of a column. It includes

predefined classes for easy layout options, as well as powerful mixings for generating more semantic layouts.

In the 2010s, the intensive use of popular layout frameworks, inspired *CSS Flexbox* and *Grid layout* specifications.

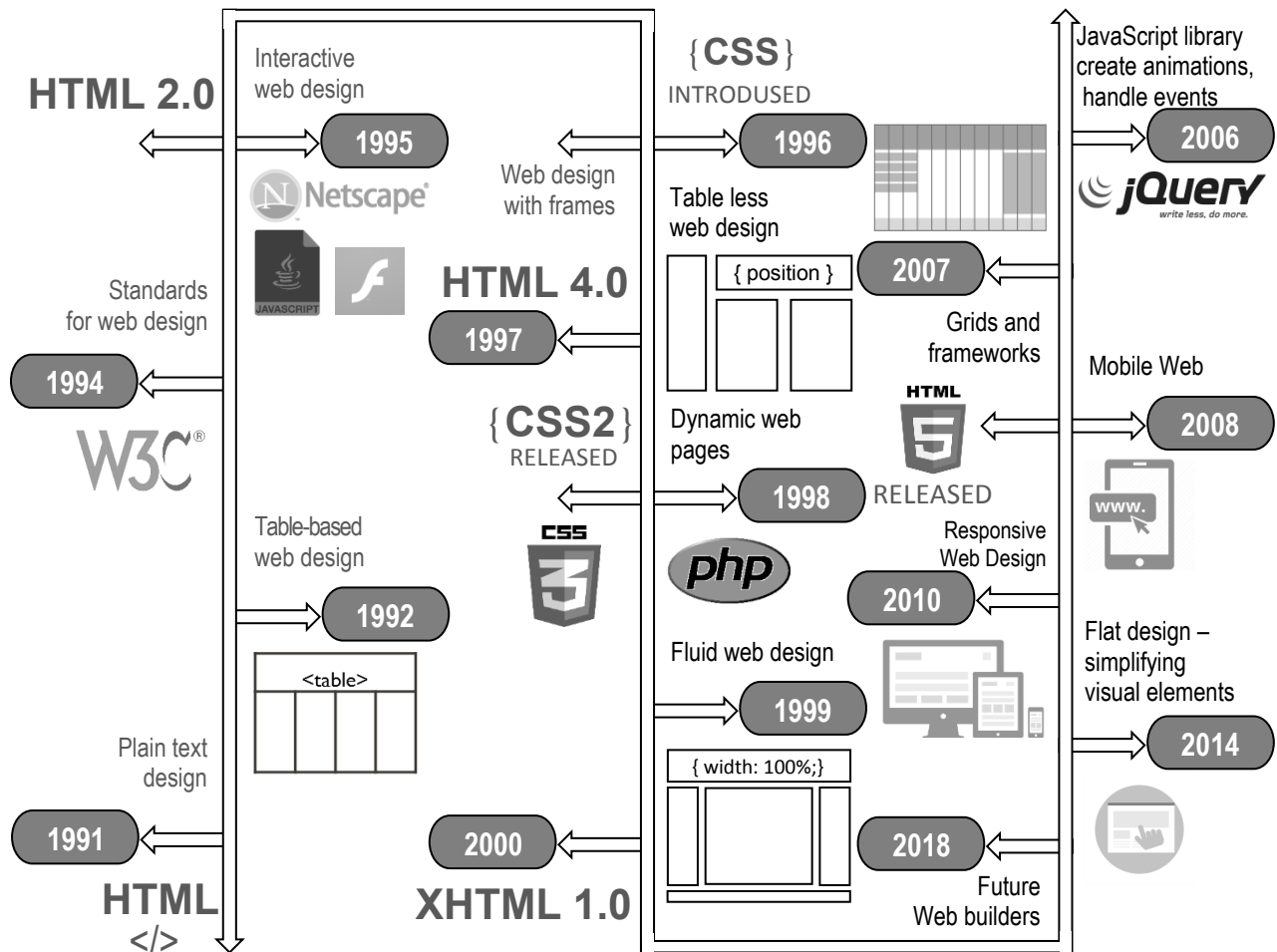


Fig. 1. The Evolution of Web Design Infographic

3. MODERN WEB DESIGN

The modern web design is focused on a simple organization of building elements, an elegant positioning of construction blocks and an easy order of content. New trends are not to be used a grid system but instead of it to apply an alignment with media queries. This web layout is possible with *Flexible Box Layout* and *Grid Layout*, standardized in the latest version of CSS.

3.1 CSS Flexible Box Layout

Flexible Box Layout or *Flexbox* is a module of CSS that defines a CSS box model optimized for user interface design, and the layout of items in horizontal and vertical

position. The concept is based on parent element that holds all child elements [5]. The parent element is called flex container and wraps any flex items. It uses the CSS display property, as the container can be defined as either flex or inline-flex. In the Flexbox model, flex items can be laid out in any direction, and can “flex” their sizes, either growing to fill unused space or shrinking to avoid overflowing the parent.

Each flex container contains two axes: the main and cross axes. The main axis is the axis on which the items align with each other. The cross axis is perpendicular to the main axis (fig.2). The axes help both horizontal and vertical alignment of the children can be easily manipulated. One of the reasons that flexbox quickly caught the interest of web developers is that it brought proper alignment capabilities to the web for the first time. Flexbox model enables proper vertical alignment, so web designers at last easily centre a box. It is easy to build items with equal height. Flexbox works well with responsive web design. The most used technique is to combine media queries with changing the width of flex items.

The reason Flexbox is not intended for layout out whole pages, is that it has a companion CSS module, the Grid Layout Module which is intended for layout.

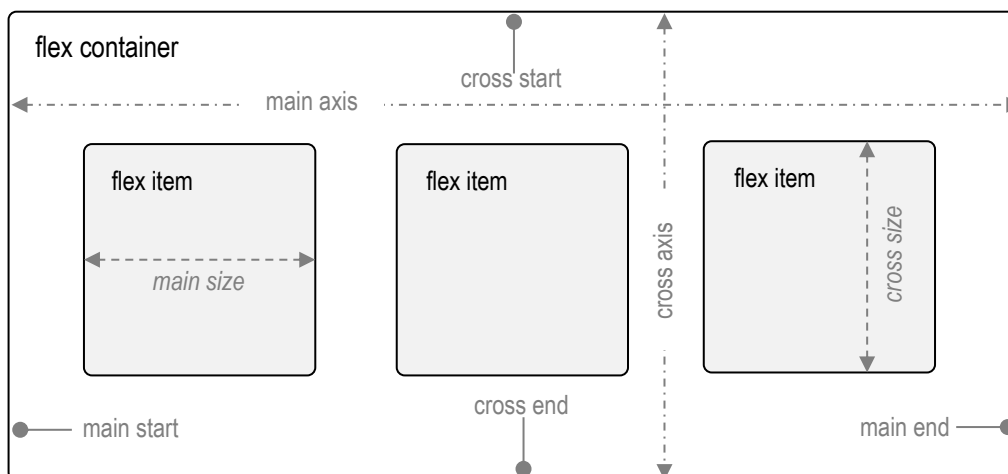


Fig. 2. Flexible Box Layout for Responsive Design

3.2 CSS Grid Layout

CSS grid layout or *CSS grid* is a technique in CSS that allows web developers to create complex responsive web design layouts more easily and consistently across browsers. Grid Layout is a CSS layout model that has powerful abilities to control the sizing and positioning of boxes and their contents. Unlike Flexible Box Layout, which is one-dimensional layout model, Grid Layout is optimized for two-dimensional layouts [6]. By combining media queries with the CSS properties that control layout of the grid container and its children, web designers can adapt their layout to different devices. Grid enforces two-dimensional alignment, uses a top-down approach to layout, allows explicit overlapping of items, and has more powerful spanning capabilities. Flexbox focuses on space distribution within an axis, uses a simpler

bottom-up approach to layout, can use a content-size-based line-wrapping system to control its secondary axis, and relies on the underlying markup hierarchy to build more complex layouts. The main difference between Flexbox and Grid Layout is browser compatibility. There is very limited support for grid at the present time. The browser support for Flexbox is much more comprehensive.

4. CONCLUSION

The modern web design uses Flexible Box Layout and Grid Layout. Grid Layout is considered to be the most appropriate technique for full page layouts. Flexbox is ideal for styling components on a page, controlling how groups of elements relate to each other. Flexible Box Layout has better browser compatibility than Grid Layout. Today, web developers combine Flexbox with responsive grid and media queries. Preferred Flexbox techniques are effect centring and equal height of elements. These properties, are embedded in grid system and are adapted through media queries, give desired results for varying resolutions.

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