ASPECTS ABOUT INTEGRATE RESPONSIVE WEBSITES FOR CYBER DEFENSE STRATEGIES - BOOTSTRAP VERSUS W3.CSS

**Livia SANGEORZAN*, Nicoleta ENACHE-DAVID[*],
Claudia-Georgeta CARSTEA[**], Denisa-Iulia CATANA[*]**

[*]Transilvania University, Braşov, Romania (sangeorzan@unitbv.ro,
nicoleta.enache@unitbv.ro, denisa04.c@gmail.com)
"Henri Coanda" Air Force Academy, Braşov, România (claudia.carstea@afahc.ro)

Abstract: This paper presents Bootstrap and W3.CSS and the difference of using them. Bootstrap gives to the web designers the ability to easily create responsive designs, since W3.CSS is a free front-end framework for faster and easier web development. In addition, it is faster and smaller than other CSS frameworks and uses standard CSS, but does not use JavaScript or jQuery. Data security represent a strategic importance in military information systems. For web designers this represent a problem because they have the responsibility to protect personal data and classified information.

Keywords: web responsive design, CSS, framework, web development.

1. INTRODUCTION

Once the web technologies are developing, web designers need to know easier and faster solutions for their work. In this paper we highlight some advantages and disadvantages in using Bootstrap and W3.CSS frameworks for designing responsive websites. The paper is structured as following: in Section 2 we present the definition of responsive design and in Section 3 and Section 4 we present some Bootstrap and W3.CSS basic elements. Finally, in Section 5 we present an application, a slide show realized with the two frameworks.

The pre-emptive principle is very important when we talk about military information systems. Privacy must be integrated into the architecture of the website, data must be secured and protected end-to-end. Web attacks are some of the most frequent ones to occur. The threat of cyber-attacks is rapidly expanding and transforming.

In conclusion, W3.CSS offers much more page customization than Bootstrap, but the two frameworks can be used successfully in web design.

2. RESPONSIVE DESIGN

Responsive design is a method used in web programming that optimizes the content of a web page in order to be displayed on a certain device. For example, the desktop might get a widescreen layout that is optimized for large displays, since a mobile phone gets a smaller layout in which all the elements of the web page is well arranged. Such elements can be used in designing complex informatics systems like the authors mention in [1] and [2].

Bootstrap uses CSS media queries that measure the width of the browser and then use the appropriate style sheet. So, the web pages can be displayed in well conditions on tablets or phones or another device.

In order to add custom CSS based on the media query, one can either include all rules in one CSS file or can use entirely different CSS files. But for larger site, we can divide each media query into a separate CSS file. In the HTML file, we can call them with the <link> tag in the head of the document.

3. BOOTRSTRAP

Bootstrap is a free front-end framework for faster and easier web development. Furthermore, Bootstrap contains HTML and CSS based design templates for forms, buttons, tables, navigation, slide shows and other elements, as well as optional JavaScript plugins. Bootstrap also gives the web programmer the possibility to create responsive designs.

Bootstrap has been launched in August 2011 and it won a big popularity. Basically, Bootstrap can be used for responsive web design and supports a 12-column, 940px-wide grid. On Bootstrap's website one can use the build tool that allows the user to customize the build as he wish, by choosing the CSS and JavaScript features.

Bootstrap is designed to be responsive to mobile devices. To ensure proper rendering and touch zooming, the web designer must add the following ***<meta>*** tag inside the ***<head>*** element:

<meta name="viewport" content="width=device-width, initial-scale=1">

The width=device-width part sets the width of the page to follow the screen-width of the device. This can be different, depending on the device. The initial-scale=1 part sets the initial zoom level when the page is first loaded by the browser, as it is mentioned in [6].

With Bootstrap, we include the link to the CSS style sheet and the JavaScript:

```
<!DOCTYPE html>
<html><head>
<title>Bootstrap 101 Template</title>
<link href="css/bootstrap.min.css" rel="stylesheet">
</head>
<body>
<script src="js/bootstrap.min.js"></script>
</body></html>
```

Buttons

Using Bootstrap, the user can customize the buttons so they have the same layout on the entire web site. For example, all the elements that use the class of *.btn* will inherit the default look of a gray button with rounded corners. However, the user can change the color of the buttons by adding new classes on the CSS definition.

The classes .btn-large, .btn-small, or .btnmini can be used on buttons in order to make the buttons larger or smaller.

```
<p>
<button class="btn btn-large btn-primary" type="button">Large button</button>
<button class="btn btn-large" type="button">Large button</button></p>
<p>
<button class="btn btn-primary" type="button">Default button</button>
<button class="btn" type="button">Default button</button></p>
<p>
<button class="btn btn-small btn-primary" type="button">Small button</button>
<button class="btn btn-small" type="button">Small button</button></p>
```

To create buttons that display like a block-level element, one simply can add the *.btnblock* class. These buttons will be displayed at 100% width.

Images

In Bootstrap, the images can be stylized using three style classes: *img-rounded* adds border-radius of 6px to give the image rounded corners, *.img-circle* makes the entire image round by adding border-radius: 500px, and *.img-polaroid* adds a bit of padding and a gray border.

Bootstrap offers more than 140 icons that can be used with buttons, links, navigation, and form fields. These icons are provided by GLYPHICONS. [5]

In order to use the icons, one must use an <i> tag with the namespaced *.icon-* class. For example, for the edit icon, one can add the *.icon-edit* class to the <i> tag:

```
<i class="icon-edit"></i>
```

If we want to use the white icon, simply add the *.icon-white* class to the tag:

```
<i class="icon-edit icon-white"></i>
```

Bootstrap contains a set of components that can be used in designing web application interfaces. These are plugins available on a separate Java Script file. The following components can be found in Bootstrap library:

- Dropdown Menus
- Buttons with Dropdowns
- Navigation Elements
- Navbar
- Button groups
- Pagination

Being an open source project, Bootstrap is a powerful tool because of the development community that supports it.

- One can download the source, or if wants to easily customize a few of the colors, sizing, or plugins, one can cater the Bootstrap to your needs via the Bootstrap website.
- When one wants to the customize page, may decide what components needs or if he uses or not any JQuery plugin. [5]
- Generally speaking, Bootstrap can fill the needs of any complex web project. Containing extensive JavaScript plugins, and robust interface components and being easy-to-use, Bootstrap is a very complex tool in web programming.

4. W3.CSS

As Bootstrap, W3.CSS is a free front-end framework for faster and easier web development. W3.CSS is web responsive and support modern responsive design. In addition, is faster and smaller than other CSS frameworks and use standard CSS, does not use JavaScript or jQuery.

The usage of this framework is easy, it is necessary to add the following link in the page source:

```
<link rel="stylesheet" href="https://www.w3schools.com/w3css/4/w3.css">
```

Another possibility to use it is to download the framework, has the same option as Bootstrap.

The most important part from W3.CSS are the containers, more exactly the ***w3-container class***. It provides equality like: common margins, common paddings, common vertical/horizontal alignment, common fonts and colors. [4]

The w3-container class is typically used with HTML container elements, like: <div>, <header>, <footer>, <article>.
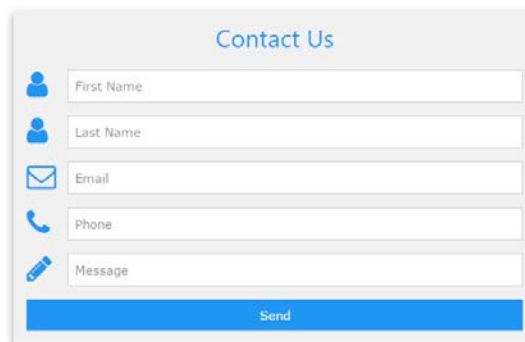
Images

W3.CSS offers more possibilities for images design. All images created with these new technologies are web responsive. In addition, at all type of images one can add grayscale effect using the w3-grayscale classes, sepia effect using w3-sepia classes and other effects. Using this framework one can create: round, circle, bordered images, etc.

Furthermore, one can find templates for creating photo albums. As Bootstrap, W3.CSS provide also the possibility to make slide show presentation.

Forms

In comparison with Bootstrap, W3.CSS provides more templates and more different types of forms. The framework provides colorful forms and in the same time animated fields. This is the most interesting functionality provide. To crate animated field is needed the w3-animate-input class that transforms the width of an input field to 100% when it gets focus.

Another form template provided by W3.CSS is Icon Labels forms. In order to create this form is needed to combine more classes and styles. The form is looking like the following one:

Buttons

W3.CSS provides a big diversity of buttons. One can add in his web site what type of button he wants. The buttons can be added in the source code easily using the class name of the button type wanted. The buttons classes are the following [6]:

- *w3-btn:* A rectangular button with a shadow hover effect. Default color is black
- *w3-button*: A rectangular button with a gray hover effect. Default color is light-gray in W3.CSS version 3. Default color is inherited from parent element in version 4
- *w3-bar*: A horizontal bar that can be used to group buttons together
- *w3-block*: Class that can be used to define a full width (100%) button
- *w3-circle*: Can be used to define a circular button
- *w3-ripple*: Can be used to create a ripple effect.

All buttons can be customizing in the way the user wants. One can add the desired color, size and shape; buttons can have different text effects, or shadow.

4. APPLICATION: SLIDE SHOW

In this section we will present different approaches of using Bootstrap and W3.CSS frameworks creating a slide show with pictures, buttons, and forms.

Slide Show

To create the slide show with HTML it is necessary to write JavaScript and PHP functions so that one can see the photos like a slide show. The functions are used for previous and next photo. We have created one more function so that the photo can be rotated. The CSS is written for each rotation degree (for 0°, 90°, 180° and 270°).

```javascript
function rotater() {
    object = document.getElementById('rotator' + current);
    if (object.className == "rotate0")
    {
        object.className = "rotate90";
    }
    else if (object.className == "rotate90")
    {
        object.className = "rotate180";
    }
    else if (object.className == "rotate180")
    {
        object.className = "rotate270";+
    {
        object.className = "rotate0";
    }
}
```

FIG. 1 Image rotate function

It is necessary to add buttons so that the pictures can be played. The functions are presented in Fig. 2.

```javascript
<script language="JavaScript" type="text/javascript">

    first=1;
    last=9;
    current=1;
    i=0;
    var ns6 = document.getElementById&&!document.all;

    function imgFilter(id) {
    var imgId = $(id); $("imgId").each(function(i)
        {
            $("this").setAttribute('src', $("this").getAttribute('data-src'));
        });
    };

    function nextPicture() {
        object = document.getElementById('slide' + current);
        object.style.display='none';
        if (current == last) { current=1; }
            else {current++ }
        object = document.getElementById('slide' + current);
        object.style.display = 'block';
    }

    function previousPicture() {
        object = document.getElementById('slide' + current);
        object.style.display='none';
        if (current == first) { current=last;}
            else {current--; }
        object=document.getElementById('slide' + current);
        object.style.display = 'block';
    }
```

FIG.2 Functions for slideshow navigation

Using HTML5 with Bootstrap it is much easier to create the slide show. Bootstrap has a class called Carousel that is designed specially for slide show. The code is included in a <div> element and is presented in Fig. 3.

```
<div class="container">
  <h2>Photo album</h2>
  <div id="myCarousel" class="carousel slide" data-ride="carousel">
    <!-- Indicators -->
    <ol class="carousel-indicators">
      <li data-target="#myCarousel" data-slide-to="0" class="active"></li>
      <li data-target="#myCarousel" data-slide-to="1"></li>
      <li data-target="#myCarousel" data-slide-to="2"></li>
    </ol>

    <!-- Wrapper for slides -->
    <div class="carousel-inner" role="listbox">
      <div class="item active">
        <img class="d-block img-fluid" src="img1.jpg" alt="ski"  class="img-responsive">
      </div>

      <div class="item">
        <img class="d-block img-fluid" src="img2.png" alt="lac" style="width:100%;" class="img-responsive" >
      </div>

      <div class="item">
        <img class="d-block img-fluid" src="img1.jpg"  class="img-responsive">
      </div>
    </div>

    <!-- Left and right controls -->
    <a class="left carousel-control" href="#myCarousel" data-slide="prev">
      <span class="glyphicon glyphicon-chevron-left"></span>
      <span class="sr-only">Previous</span>
    </a>
    <a class="right carousel-control" href="#myCarousel" data-slide="next">
      <span class="glyphicon glyphicon-chevron-right"></span>
      <span class="sr-only">Next</span>
    </a>
  </div>
</div>
```

FIG. 3 Slide show with Bootstrap

Another method for realizing a slide show is using HTML5 with W3.CSS. The only disadvantage using this framework is that is needed to write JavaScript code. JavaScript functions are added to select images. The function showDivs() is used to display the first image and the function plusDivs() is called when the user clicks one of the buttons. The first function hides all elements with the class mySlides and displays the element with the given index. If the index is higher than the number of elements then the variable is set to zero and if the index is less than 1 it is set to number of elements.

It is also necessary to create many elements using the class mySlides. These elements are the images from the slide show. In the end we add two buttons to scroll the images, like in Fig. 4.

```
<h3>3. Slide show</h3>
        <div class="w3-content w3-display-container">
                <img class="mySlides" src="img1.jpg" style="width:100%">
                    <div class="w3-display-bottomleft w3-large w3-container w3-padding-16 w3-black"> Lac </div>
                <img class="mySlides" src="img2.png" style="width:100%">
                <img class="mySlides" src="img1.jpg" style="width:100%">

                <button class="w3-button w3-black w3-display-left" onclick="plusDivs(-1)">&#10094;</button>
                <button class="w3-button w3-black w3-display-right" onclick="plusDivs(1)">&#10095;</button>
        </div>
```

FIG.4 Buttons for images scrolling

Using W3.CSS to create the album is very easy and provides more templates for albums gallery. Beside the slide show, this framework comes up with other predefined templates for albums. In Figure 5 one can see two more types of albums using W3.CSS.
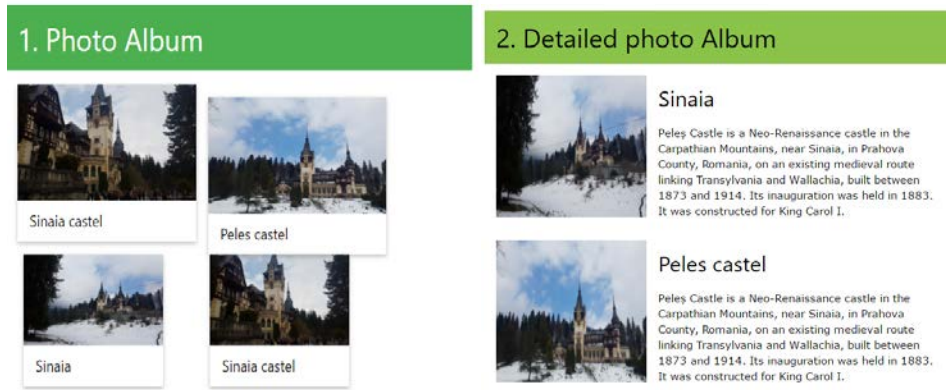
FIG. 5. Types of photo albums with W3.CSS

Images

In Bootstrap and W3.CSS photos can have different shapes. For example, they can have the shape of a circle or they can have border. The classes used for images are almost similar in Bootstrap and W3.CSS, the difference is that W3.CSS class has **w3** followed by the shape name [4]. In Figure 6 one can see the HTML code with Bootstrap and W3.CSS.
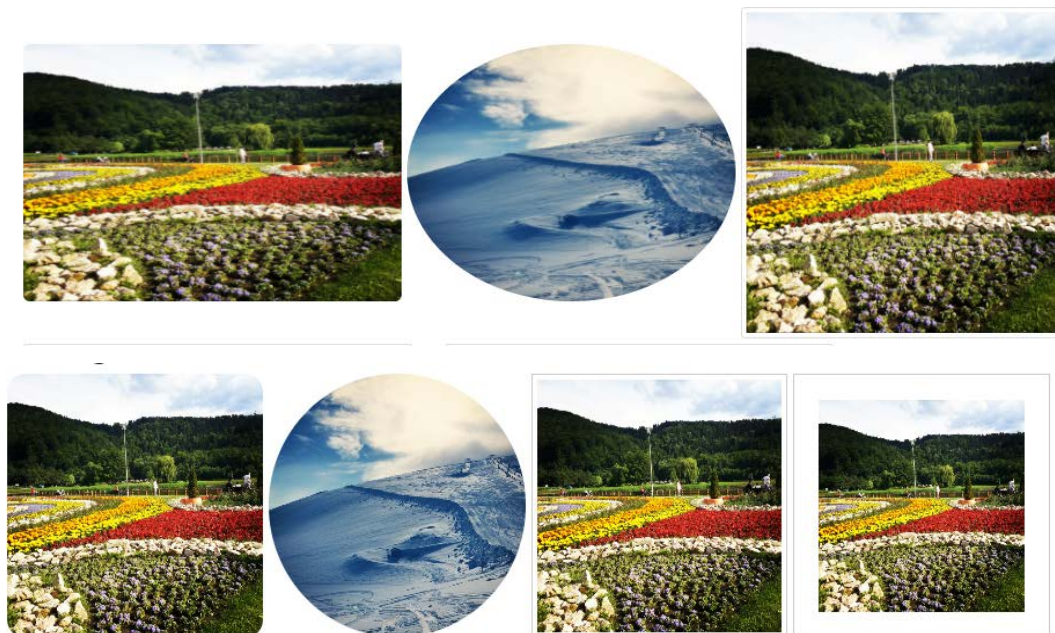
```
<!--Bootstrap-->

    <img class="img-rounded" src="img1.jpg" width="350" height="236">
    <img src="img2.png" class="img-circle" width="304" height="236">
    <img src="img1.jpg" class="img-thumbnail" width="304" height="236">

<!--W3.CSS-->

    <img src="img1.jpg" class="w3-round-xlarge" style="width:20%">
    <img src="img2.png" class="w3-circle" style="width:20%">
    <img src="img1.jpg" class="w3-border" style="padding:4px;width:20%">
```

FIG. 6 HTML code for images with Bootrstrap versus W3.CSS

In browser we can see

W3.CSS has classes for different effects like opacity, sepia or hover image. This effect can be added to a photo using inside the <img> tag the desired class. One can set the size of the picture using the property "style".

```
<img src="img1.jpg" class="w3-opacity-max" style="width:150px">
```


25% opacity   60% opacity

CONCLUSIONS

In conclusion, the most effective way to create more interactive and diversified web pages is to use the W3.CSS framework. It offers much more page customization than Bootstrap, but the two can be used in a similar way and with many elements in common.

In addition, an extra reason for using HTML5 is its feature of being compatible with all Internet browsers. It is compatible with browsers such as Chrome, Internet Explorer, Firefox, Opera or Safari.

Considering the massive explosion of mobile phones, smart phones, tablets and other mobile gadgets, HTML5 is optimized to build applications and mobile sites. HTML5 is used to build responsive sites supported by different types of mobile interfaces.

REFERENCES

[1] C.G. Carstea, Modeling System's Process for Control Of Complex Information Systems, Proceedings of The 25th International Business Information Management Association Conference (IBIMA), May 7-8, Amsterdam, Netherlands, ISBN: 978-0-9860419-4-5, pg.566, 2015;

[2] C. Carstea, New approach about project management of complex information systems, Ed. LAP LAMBERTAcademic Publishing GmbH & Co., Germany, 2011;

[3] R. Nixon, Learning PHP, MySQL & JavaScript With jQuery, CSS & HTML5 – Fourth Edition, Sebastopol California, Ed. O'Reilly Media, 2014;

[4] L. Sangeorzan, G.A. Stelea, N. Enache-David, Web Development Techniques for Applications and Websites, Ed. Univ. Transilvania din Brasov, 2016;

[5] Spurlock, J., Bootstrap, Sebastopol California, Ed. O'Reilly Media, 2013.

[6] https://www.w3schools.com/w3css/.