

Responsive Design Strategies



Special Project
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Approval Sheet

The Industrial Design Special Project entitled “Responsive Design Strategies” by Srinivas Godala; Roll no.126250012 is approved, in partial fulfilment of the Master in Design Degree in Visual Communication at the Industrial Design Centre, Indian Institute of Technology Bombay.

Project Guide: _____

Date: _____

Place: _____

Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/ data/face/source in my submission.

I understand that any Violation of the above will be cause for disciplinary action by the institute and can also evoke penal action from the sources which have thus not been properly cited off from whom proper permission has not been taken when needed.

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Date:

Acknowledgement

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Abstract

The main objective of the project was to analyze and understand the Responsive design strategies in web design. This project focuses on the need for responsive web design for a wide variety of users looking at the mobile usage in the current day scenario. With increasing trends in the use of smart phones and tablets of different screen size, it became difficult and complex to maintain the website that fits best on different screen sizes. Responsive Web Design (RWD) is found to be an effective way of solving the issue of site management for different end users.

As the name suggests, RWD is a conceptual design of website with the properties of liquid, which occupies the shape of a container without losing its properties. RWD conceptualizes on three main fundamental blocks of website construction. Which are Media queries, Fluid grids and Flexible images.

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1. Introduction

With the advent of mobile devices, people are using it for almost every task which was possible only on a desktop computer. The use of mobile devices like smart phones and tablets satisfy the need of the user to such extent that they don't feel the need to go to a desktop and do with the same transactions. The current mobile devices not only allow the users to browse internet but also allows user to check emails, use social media as well as transact online shopping services.

With this rapid use of mobile usage of internet, it has become very important for website hosts to make their products usable on a mobile device. And the important factor is, how a website effectively brings out the information for the user to use in a restricted space of the provided mobile device.

It is then where the need of a responsive design comes, which would automatically suit up with the device being used. This would help for customer satisfaction and better user experiences.

1.1 Aim of the Project

The aim of the project is understand the present trends in Responsive Design Strategies and how changes came drastically on device based, Updating the technical knowledge which is support to responsive design.

2. Process

Compilation of Articles

When I started this project, my first approach was to study and collect the information about responsive designs. I collected articles both online and offline, as well as studied about them.

Website Compilation in Responsive Design Strategy

Before starting with the website compilation, I observed the basic design elements which play an important role in defining the responsiveness of a website, which are as follows Typography, Grid, and Layout, Colour

2.1 Compilation of Articles

Article 1: Responsive Design vs. Mobile Site: benefits and Drawbacks

Author: Brian Middleton

Description: This article briefly explains about the responsive design and mobile site methodologies to maintain a particular website to offer a customized graphical user interface. It also describes comparative assessment of the two methods.

According to Brian, Responsive Design (RD) is a concept which uses customized layout that adapts in response to a changing screen size without losing important information pertaining to a website. As the name suggests, RD uses the same coding and content to maintain the website in all screen sizes. The possible drawbacks of RD include the longer lead time for project completion because of slow production of site design since it needs more layouts in response to changing screen sizes. Data duplication according to CSS in response to changing layout may be necessary, which adds to additional level of complexity to the design of the project.

Mobile site is a methodology which adopts a particular screen size as a target and customizes a particular website which best fits for the mobile device being used. It is easy and less expensive to launch these mobile sites since they relaxed from legacy code and contains essential information pertaining to the website in a streamlined interface. Since the mobile site is completely decoupled with the main website, one has to maintain a separate silo of information to maintain it. It is very important to update and maintain consistency among the two sites which adds to maintenance cost over time.

Opinion: The article outlines the comparison of responsive design and mobile site methodologies to maintain a site. Potential benefits and drawbacks of the two methods are explained. There is no clear description about changing layouts in different screen sizes.

Article 2 : Responsive Web Design

Author: Omni update

Description: This paper focuses on the need for responsive web design of the websites for a wide variety of users according to the mobile device being used. With increasing trends in the use of smart phones and tablets of different screen size, it became difficult and complex to maintain the website that best fits the varying screen size. To address the issue of site management for different end users, Responsive Web Design (RWD) is found to be a more effective way of problem solving. As the name suggests, RWD is a conceptual design of website with the properties of fluid, which occupies the shape of a container without losing its properties. According to this paper, RWD conceptualizes on three main fundamental blocks of website construction. They include

1. Media queries, which inspects the physical characteristics of the device requesting it.

2. Fluid grids are the responsive layouts that best suited for the screen size.
3. Flexible images are those images which scaled according to the need of the grid layout.

Opinion: This paper articulates the underlying concepts in RWD. It is a basic outline of the RWD.

Article 3: How to Deliver Fast, Engaging Responsive Web Design Sites

Author: Akamai faster forward

Description: The internet shopping traffic from mobile users for the holiday shopping season grew from 6 % (2010) to 24 % (2012) in USA. From this, it is evident that engaging mobile users with fast, quality web experience has become the core business requirement. This is not only limited to e-commerce organizations but also spans across banking, aviation, health and many more service based industries. In some sense, Mobile has become a global phenomenon and overtook computer in achieving the targeted needs of an end-user. According to stat counter, mobile traffic in India surpassed desktop traffic in August 2012, possibly due to access to mobile devices at cheaper price and reforms in telecommunication sector. With this backdrop, it is very important to mention about the varying needs of different mobile devices to display a particular website. RWD is one way of dealing this challenge. RWD adoption is partly driven by the operational efficiencies due to elimination of a different design and development

phase. According to Face book, 7000 different mobile device types access the site every single day. With mobile internet traffic is increasing over time, the mobile devices have grown more powerful, networks have become faster and more consistent, so to have the expectations of mobile end-users grown.

Although fast, quality experience is a pre-requisite for success, it is not easy to deliver may be partly due to the same size of the RWD site across different screen sizes, which causes more delay to suit the need of the CSS layout. There also exists an additional hindrance form the customer side due to limited computing power of the underpowered mobile devices. Another potential challenge is to bridge the gap of processing and rendering service needs of the end-users connected with unpredictable Wi-Fi or congested 3G networks by using RWD sites developed on high bandwidth and low latency wired cable connections. Most of the RWD sites are unable to offer the end-user satisfaction due to little understanding of the changing needs of the end-user over time.

Top-to-bottom approach of rendering these services often leads to performance shortcomings. The bottom line of the story is to deliver fast, quality responsive web design sites, which will improve the revenue. More the delay in loading the page, higher is the abandonment rate; which leads to less revenue. According to a survey done by web performance optimization guru Steve Souder, 80-90 % end-users response time is spent on the front-end. Using Content Delivery Network (CDN) and leverage optimal delivery mechanisms (such as SPDY) may improve the performance of the RWD, especially for wireless applications. To deliver faster pages, the key steps to be considered include:

1. Reducing the number of requests by consolidating multiple CSS and JavaScript files, in-lining small images and leveraging new caching features in HTML5.
2. Reducing the number of bytes by keeping check on file size by using adjusting image formats, improving cache management, compressing files, and removing data such as comments, whitespaces and image metadata.

3. Accelerating rendering can be managed by making decisions to loading of content (serial vs. parallel), identifying resource types that block rendering. Unfortunately, parsing and execution of complicated HTML, CSS and JavaScript code is not clearly defined. The logic changes between old and new browsers, is limited by backward compatibility and is not customized to a site.

Criteria	Responsive Web Design	Mobile Web App
Versions	Single version – build the website and optimize across mobile devices	Two separate versions – build one for website and another for mobile
Development Cost	Higher. Cost increases with increase in number of elements in the website	Medium
Implementation Time	Longer development cycle. Development complexity increases as the website map gets more complex	Less time if you know the exact features you need and you have planned your roadmap well
Design Approach	Requires specialized knowledge of this new approach	Straightforward if you know the exact features and functionality you need in your mobile solution
User Experience	– Slightly lower user experience since the app is designed for a website and optimized across mobile devices – Navigation enabled from top to bottom by default. Left to right navigation requires additional customization and modification in layout and code	– Better user experience, specifically designed for mobile phone and improving further with HTML5 technology – Left to right navigation enabled to support carousel navigation
Performance	Potential bandwidth issues when server sends larger media than needed and text-heavy images	Better, more streamlined performance
Ongoing Maintenance	– Lower maintenance cost and effort – Single version to maintain for the website and across a wide range of mobile devices – Provides control and flexibility to make changes in website, which are reflected across all mobile devices	– Medium – Separate for website version and mobile web app version – Requires changes to be made separately in website and mobile web app versions

The comparative assessment of RWD and mobile site is given in this image as adopted from the article:

Article 4: RWD vs. Mobile Web App: What's best for your Enterprise?

Author: Rapid value

Description: Rising global internet traffic (with almost 7% in 2011 to 12% in 2012) has revolutionized business entities to shift towards “Mobile First, Desktop Second” strategy with the use of Response Web Design. RWD enables self-optimization of a site across all mobile devices. Mobile application is a customized / tailor-made approach for designing a site for mobile devices. RWD offers an optimized view of the site without losing its native features. RWD eliminates the need for resizing, panning and scrolling by the user in order to view the site in the new device. Some of the advantages of RWD include:

1. Single code base
2. Renders to all screen sizes
3. Low maintenance cost
4. Improves SEO
5. Ease of control and flexibility

The most appropriate applications of RWD would be Corporate Websites/blogs, media / news sites, location based services. Key challenges of RWD are listed below:

1. Poor user experience in comparison to mobile site
2. Only supports top to bottom navigation
3. Longer development cycle

The comparative assessment of RWD and mobile site is given below as adopted from the article:

Article 5: Responsive Design Guide

Description: Logistics of the RWD process:

1. Wireframing, the step that is least benefited from RWD process. Fluid grids may bridge the gap to some extent to deliver the requirements of the screen size.
2. Graphic Design in the dynamic layouts uses coherent color schemes and typography principles (such as optimal reading lengths) along with recognizable logo at all resolutions.
3. User experience testing
4. Content design and development
5. The highlights of the RWD process include:
6. Better managed mobile presence with all combinations of screen sizes and operating systems
7. Allows implicit focus on flexible layout design of the site; but need to focus on mobile experience from an end-user perspective
8. Better user experience

Article 6: How to design Responsive Website

Author: Equator

Description: Key points to consider while designing RW:

1. Understanding the motivation behind RW design
 - Site that is flexible and suits any screen size
 - Keep check on the maintenance costs of site
 - Site should fit well into the future technological developments
2. Defining underlying reasons for RW design
 - Different goals of the user on different devices
 - Technological considerations that make site more functional with less content
 - Wireframing
3. Researching requirements
 - Grid structuring and components in different layouts
 - Testing throughout the process

Article 7: Responsive design for mobile rendering

Author: Bluehornet

Description: According to a survey by bluehornet,

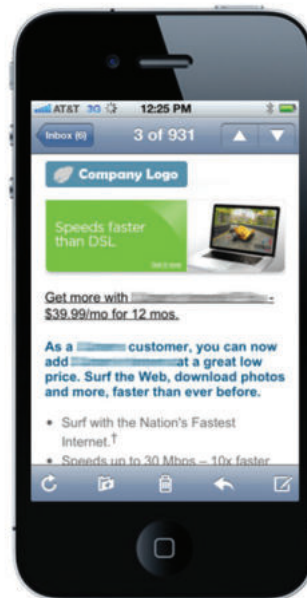
1. 77% own a mobile device enabled to receive email.
2. 68% use their mobile device to sort through emails before they read them.
3. 45% never click on the “view this email online” from a mobile device. 48% sometimes click.
4. 70% delete an email if it doesn’t look good on their mobile device.
5. 75% have negative perception of a brand from a poorly designed email.

Case Study1: Email: Changing the layout

- Code the email following best practices
- Target design elements with ID selectors
- Add the media query and CSS to the style list
- Test the email



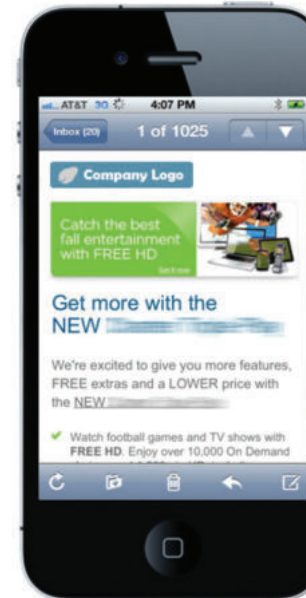
Desktop



Mobile Friendly



Desktop



Responsive

Article 8: Knotice guide responsive design

Author: Knotice

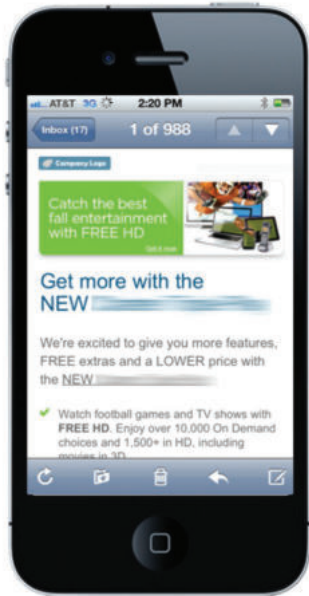
Description: Samples of design approach include

1. Mobile friendly design
2. Responsive design
3. Predictive design
4. Responsive Vs. predictive

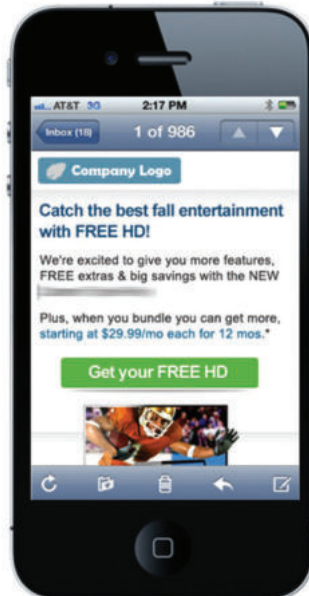


Desktop

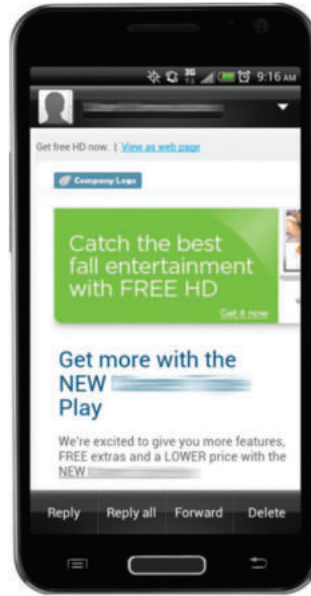
Predictive



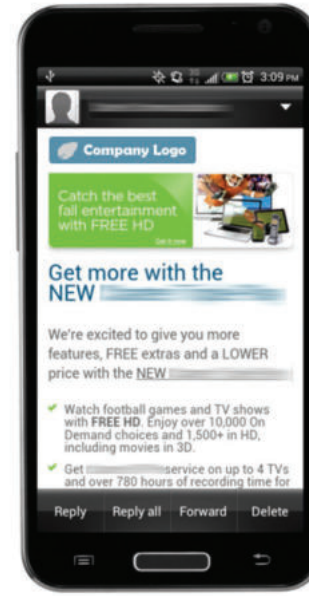
Responsive



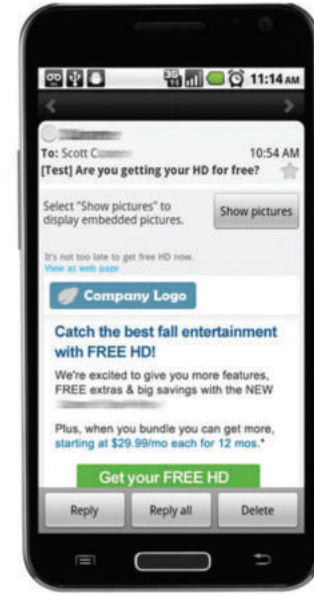
Predictive



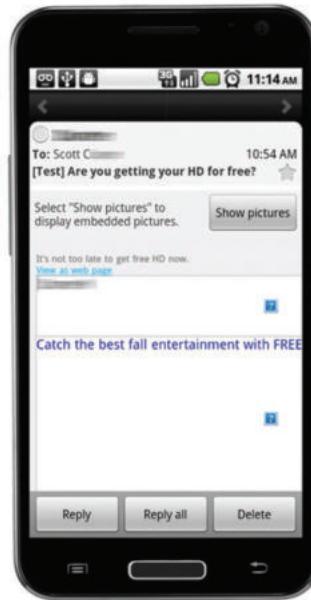
Desktop



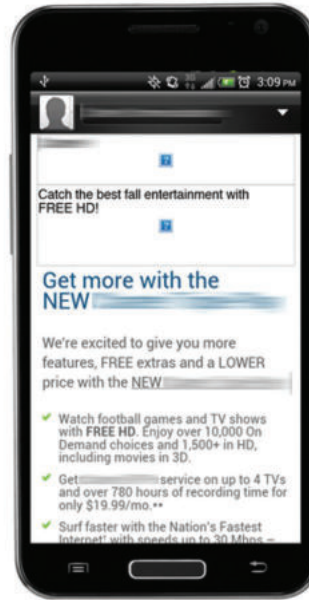
Responsive



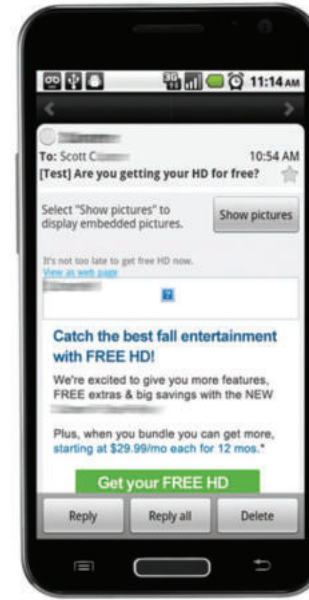
Predictive



Desktop



Responsive



Predictive

Article 9: Understanding Responsive Design

Author: Forrester

Description: This article explains the advantages involved in RWD:

1. A single code base for all web experiences
2. A single site for all web experiences
3. A reduction in maintenance risks and release cycle times
4. A single “device-agnostic” URL structure
5. A noncompeting SEO format
6. A way to size up as well as down
7. A consistent and optimized experience across all web-enabled touch points

Article 10: Responsive Web Design E-Book

Author: Syncore

Description: Responsive web design was developed for the purpose of creating one singular website that can be available to any user on any device. RWD creates a sense of consistency in both content and brand message across multiple platforms - a feat which simply cannot be replicated with the use of a separate mobile site. It is a good idea to consider a responsive web design for your website, but you must approach this task with caution. RWD is a powerful tool, not an overarching strategy. Take the time to give careful thought to how you want users to interact with your website; think about navigation, content, and overall experience. In the end, people don't care whether or not your website utilizes the latest technologies or follows the most popular design trends. What they do care about, though, is whether or not your website works and brings them to the information they desire. Give them a great user experience, and they'll keep coming back for more.

2.2 Websites Compilation

Basic elements categorized three types
those are Typography, Layout and color

Typography elements

1. font:
2. font-family:
3. font-size:
4. font-style:
5. font-variant:
6. font-weight:
7. Heading: h1, h2, h3, h4, h5, h6
8. Hyperlinks: unvisited link, visited link, active link
9. text-align:
10. text-decoration: underline
11. text-emphasis:
12. text-height:
13. text-indent:
14. text-justify:
15. text-wrap:
16. word-wrap:
17. text-outline:
18. text-overflow:
19. text-shadow:
20. text-transform:

Layout elements

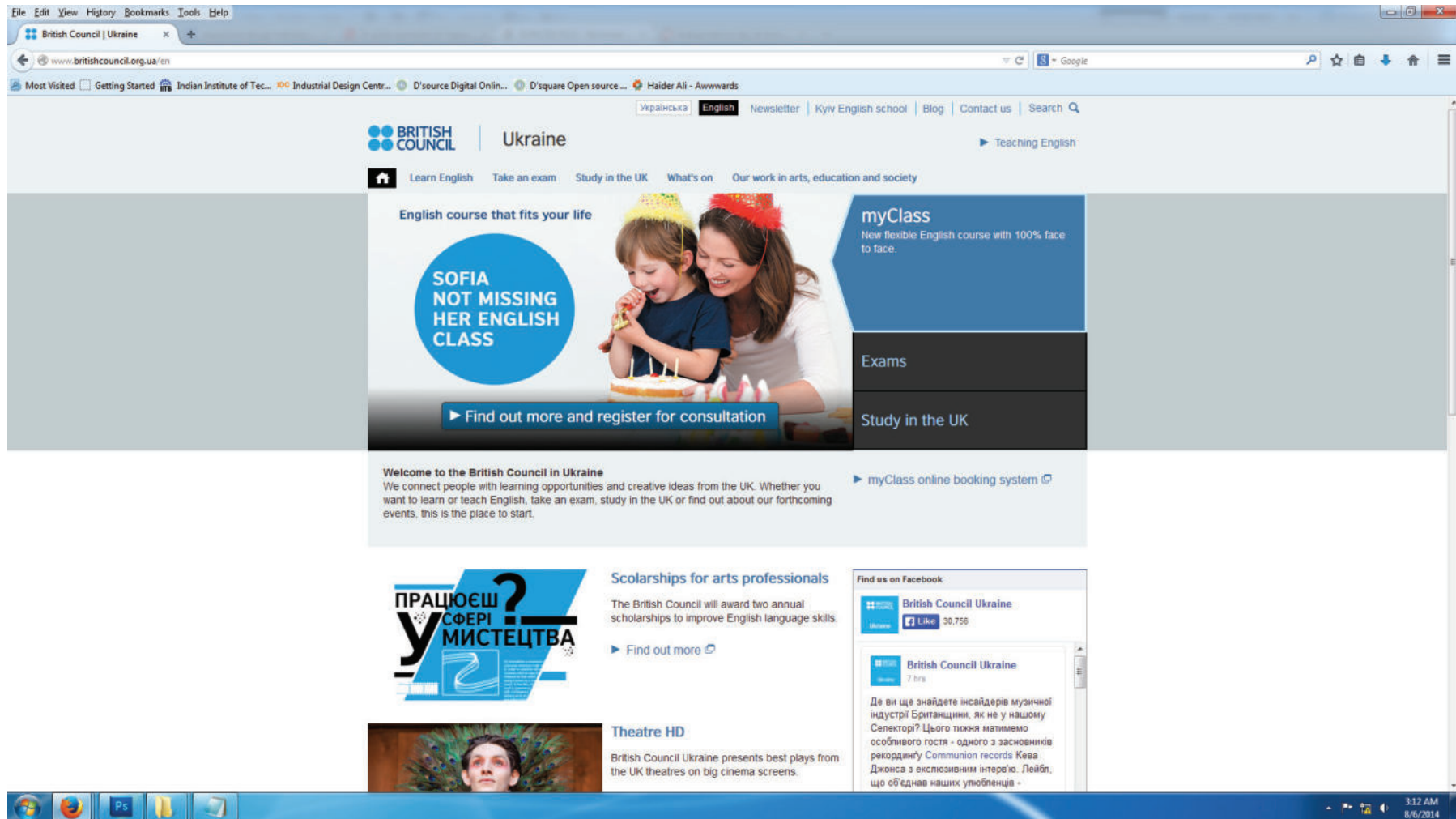
1. grid-columns:
2. grid-rows:
3. margin:
4. margin-left:
5. margin-bottom:
6. margin-right:
7. margin-top:
8. column-count:
9. column-fill:
10. column-rule:
11. column-span:
12. column-width:
13. columns:
14. padding:
15. padding-left:
16. padding-bottom:
17. padding-right:
18. padding-top:
19. border:
20. border-left:
21. border-right:
22. border-bottom:

- 23. border-top:
- 24. border-color::
- 25. border- style:
- 26. border- width:
- 27. border-image:
- 28. line-height:
- 29. table-layout:
- 30. align-content:
- 31. align-items:
- 32. align-self:
- 33. alignment-adjust:
- 34. alignment-baseline:
- 35. background:
- 36. background-color:
- 37. background-image:
- 38. background-position:
- 39. background-repeat:
- 40. background-size:
- 41. page:
- 42. page-break-after:
- 43. page-break-before:
- 44. page-break-inside:

Colour elements

- 1. Primary colours
- 2. Secondary colours
- 3. Tertiary colours
- 4. Contrast colours
- 5. Complementary colours
- 6. Neutral colours
- 7. Cool colours
- 8. Warm colours
- 9. Hue
- 10. Saturation
- 11. Monochrome
- 12. Colour

Website Compilation 1



The table shows different elements which are changing in each device. The elements are i) typography ii) layout and ii) color
In PC, no change occurs but in tablet and

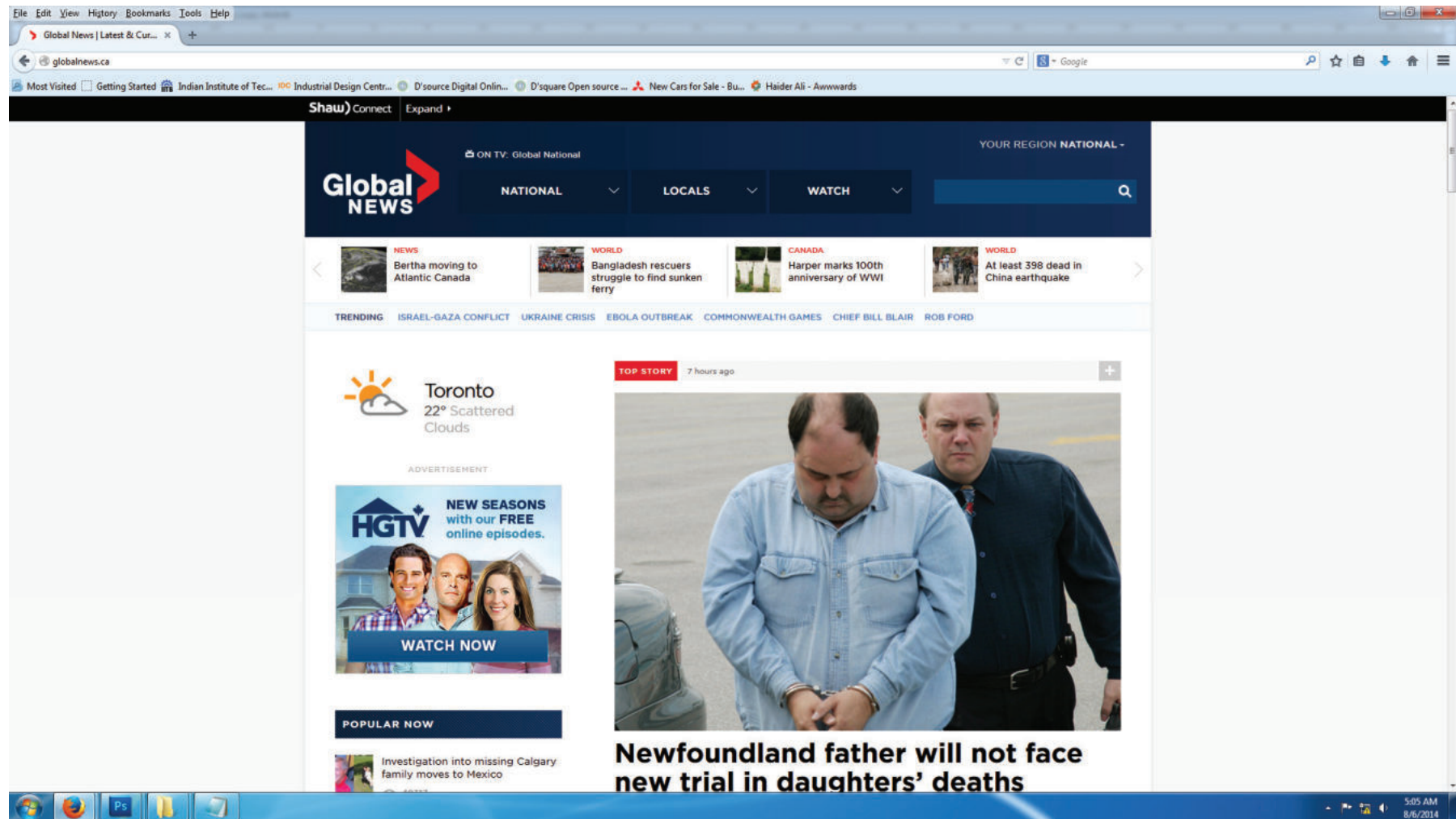
mobile the layout is changing according To the screen resolution. Color remains the same for consistency of the page, as well as the typography is unchanged for readability.

	Typography	Layout	color
PC	font-family: Helivetica Neue, Helivetica, Arial, lucid grand, tahoma font-size:13px ; font-weight:400; text-align: left; text-decoration:underline h1,h2,h3,h4,h5,h6{font-family: Helivetica, Arial, sans-serif} h1{font-size:19px} h2{font-size:17px}	grid-columns:3; grid-rows:4; margin: 0px; align: centre;	background-color: #c2ccce Body: background-color:#C2CBCE; footer background-color:#024381;
Tablet	font size not changing readability purpose all type fonts sizes are remain same in tablet	grid-columns:2; grid-rows:4; margin: 0px; align: centre;	the font and background colors are remain same
Mobile	font size not changinged	grid-columns:1; grid-rows:4; margin: 0px; align: centre;	the font and background colors are remain same

Website: <http://www.britishcouncil.org.ua/en>



Website Compilation 2

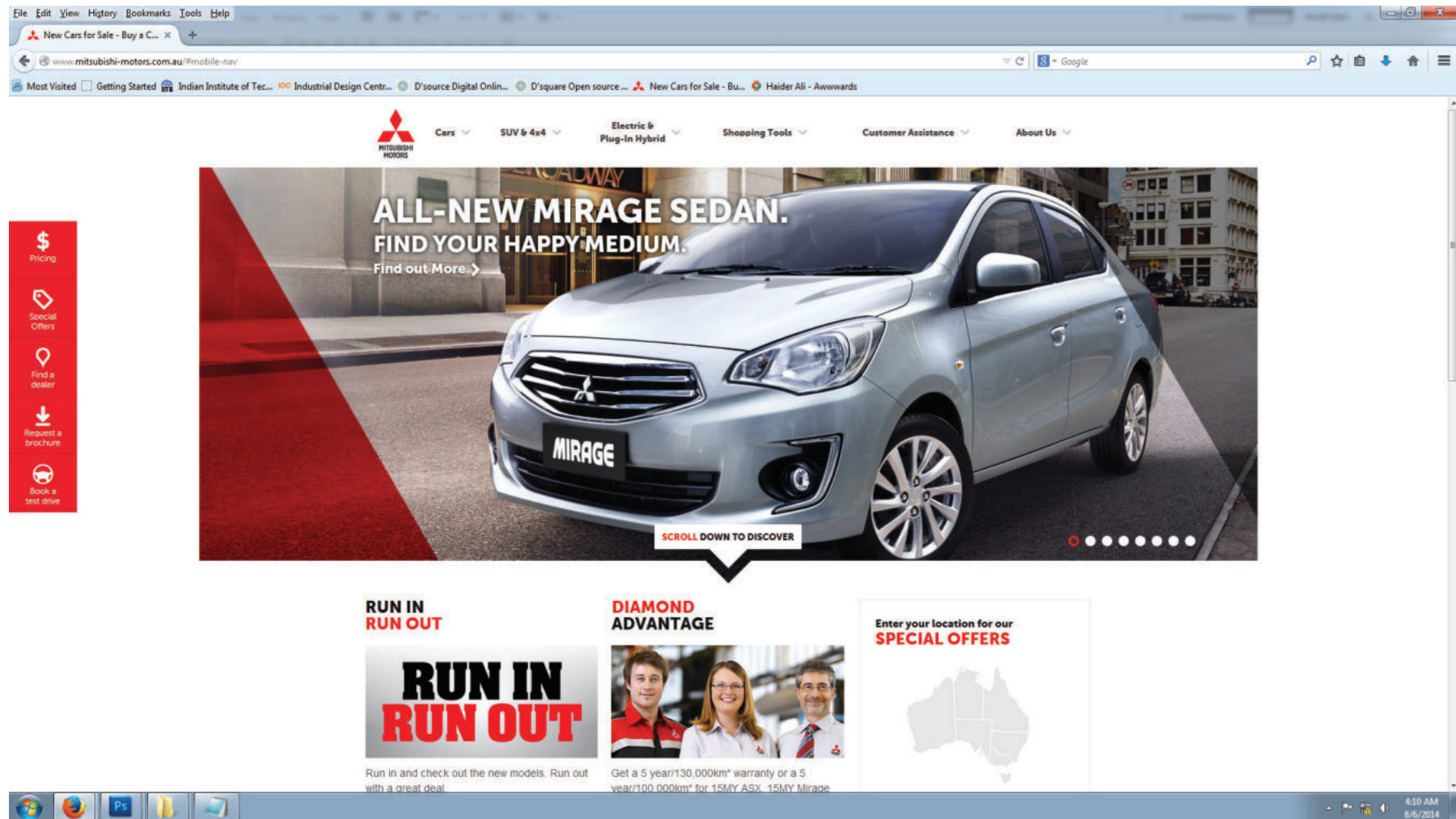


	Typography	Layout	color
PC	font-family: "Gotham A"; font-size: 16px; color: #444; text-align: left; h1 font-color: #000; font-family: "Gotham A", "Gotham B"; font-size: 36px; font-size-adjust: none; font-stretch: normal; font-style: normal; font-weight: 700; h3 font-size: 18.7167px;	grid-columns:2; grid-rows:3; margin: 0px; position: absolute; container max-width: 1120px; background-position: 0%; background-repeat: repeat; box-shadow: rgba 0px 1px 6px 0px; 0px;	Header background-color: #002D56; font-color: #444; Body: background-color: #FEFEFE; footer background-color: #001C1E;
Tablet	h1 font-size: 36px; h3 font-size: 18.7167px; Remaining same are same	grid-columns:2; grid-rows:16; margin: 0px; align: left;	background colors are remain same
Mobile	h1 font-size: 24px; h3 font-size: 16px	grid-columns:1; grid-rows:16; margin: 0px; align: left;	background colors are remain same

Website: <http://globalnews.ca>

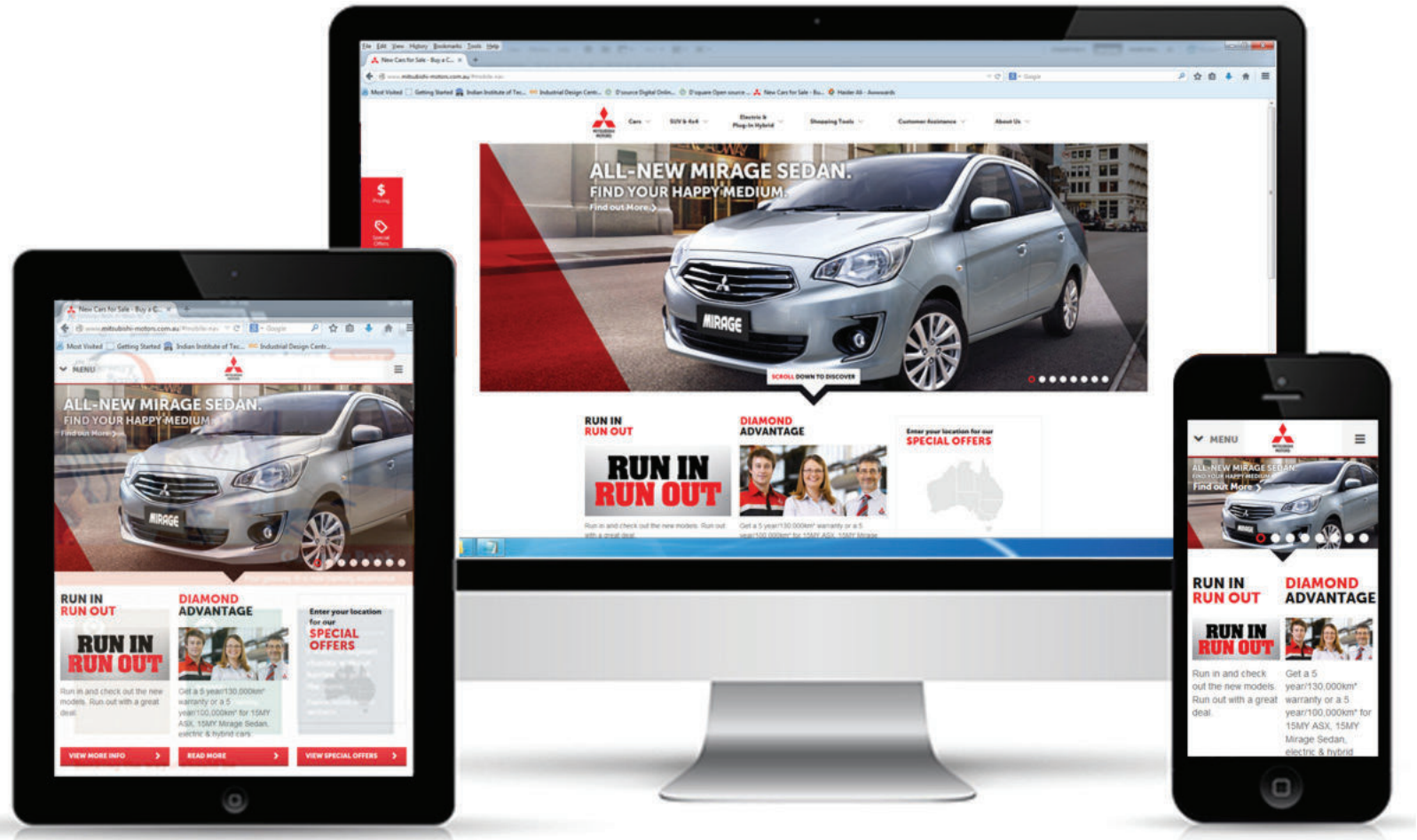


Website Compilation 3

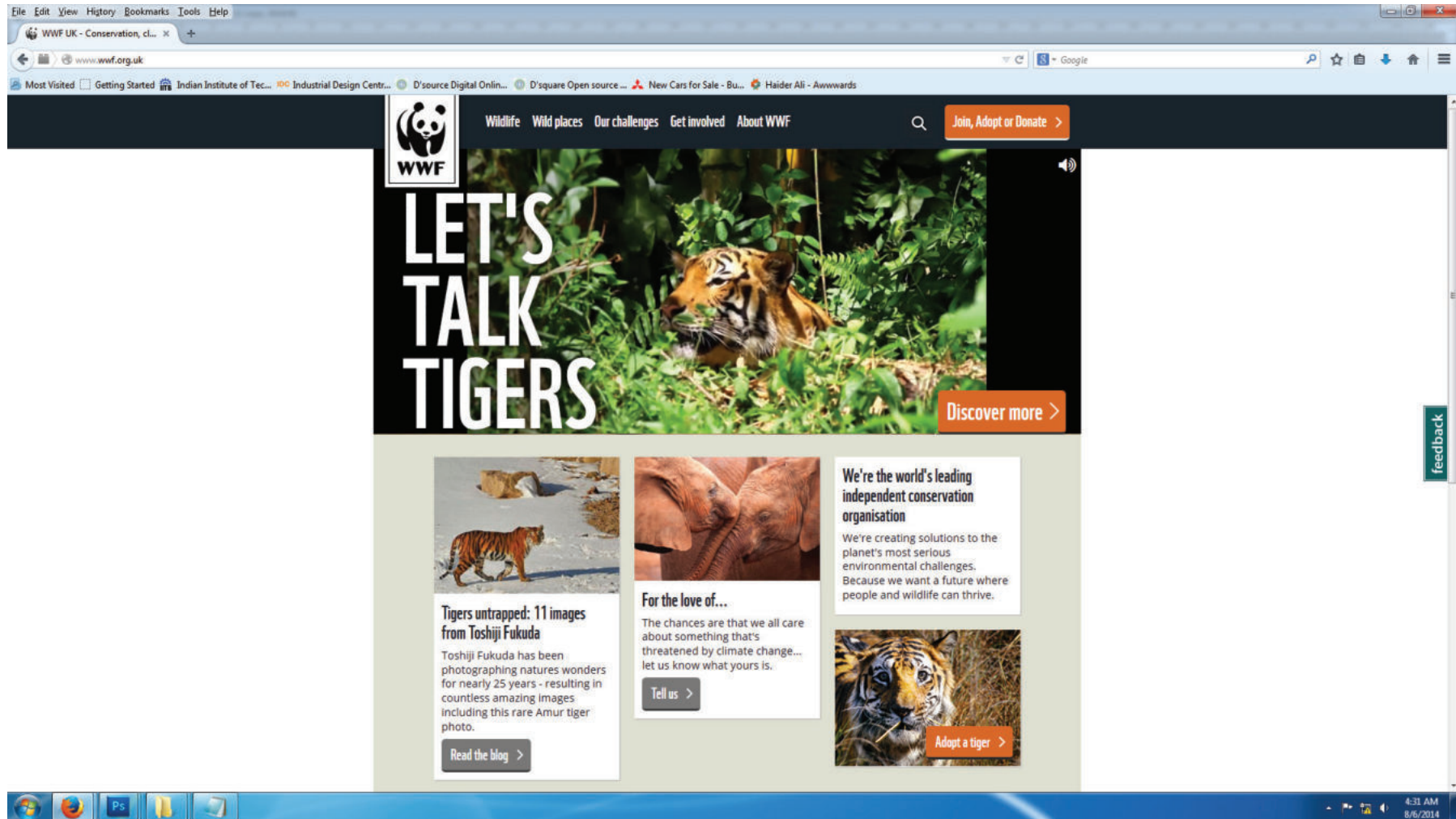


	Typography	Layout	color
PC	font-family: "Gothami"; font-size: 14px; color: #5E5E5E; text-align: left; h2 color: #EC1C23; font-family: 'museo_sans_900regular',Arial,sans-serif; font-size: 30px ; line-height: 30px; margin-top: 0px; text-align: center; text-transform: uppercase;	grid-columns:3; grid-rows:6; margin: 0px position: absolute container width: 1400px; height: 550px; color: #222; position: relative;	Header background-color: #002D56; font-color: #444; Body: background-color: #222; footer background-color: #F0F0F0; font-color: #222;
Tablet	h2 font-size: 30px ; line-height: 30px ; Remaining are same	grid-columns:3; grid-rows:6; margin: 0px; align: left; Remaining are same	background colors are remain same
Mobile	h2 font-size: 24px ; line-height: 24px ;	grid-columns:2; grid-rows:6; margin: 0px; align: left;	background colors are remain same

Website: <http://www.mitsubishi-motors.com.au>



Website Compilation 4

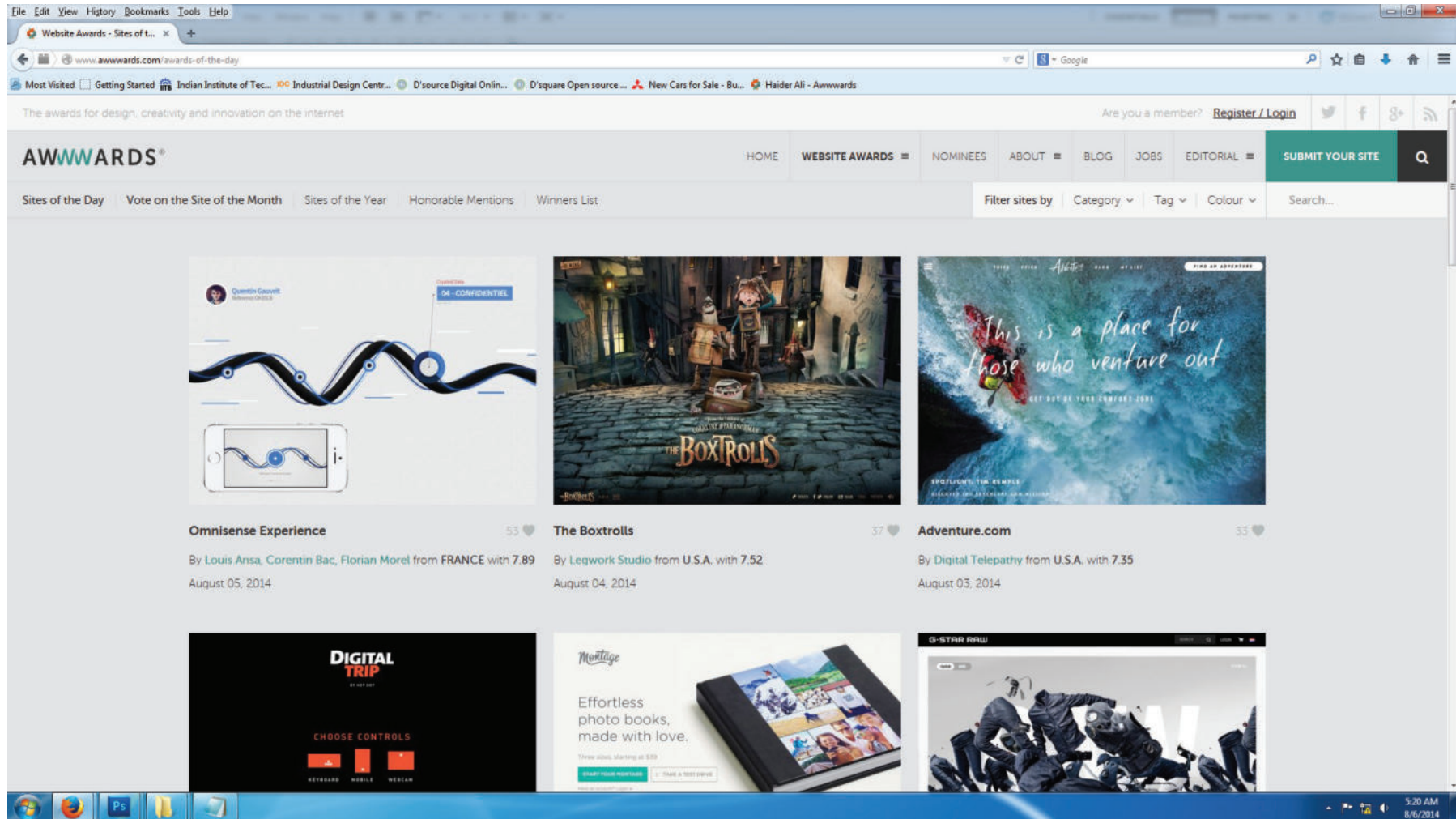


	Typography	Layout	color
PC	font-family: 'Open Sans',sans-serif; font-size: 16px; h2 color: #000; font-family: 'WWFRegular',sans-serif; font-size: 32px ; font-style: normal; font-weight: 400; text-align: center; vertical-align: baseline;	grid-columns:3; grid-rows:3; margin: 0px position: absolute content body color: #000; width: 935px; footer height: 281.733px; width: 1349px; position: relative; vertical-align: baseline;	Body: background-color: transparent; footer background-color: #F5F5EB; color: #000; display: block;
Tablet	h2 font-size: 32px ; font-weight: 400; Remaining are same	grid-columns:2; grid-rows:4; margin: 0px; align: left; Remaining are same	background colors are remain same
Mobile	h2 font-size: 32px ; font-weight: 400;	grid-columns:2; grid-rows:4; margin: 0px; align: left;	background colors are remain same

Website: <http://www.wwf.org.uk>

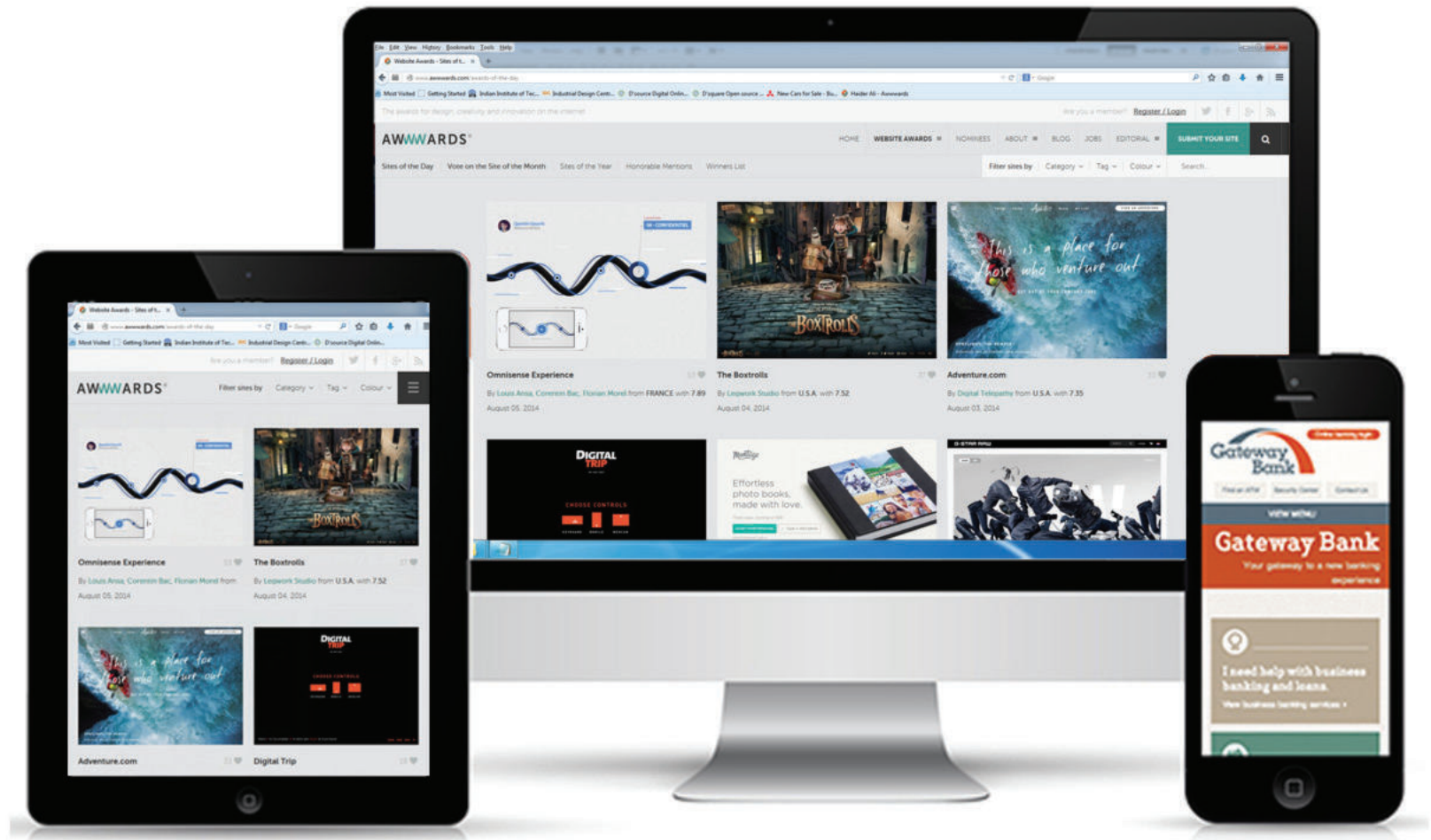


Website Compilation 5



	Typography	Layout	color
PC	font-family: 'MuseoSans_Fat'; font-size: 17px; color: #64686A; font-weight: 400;	grid-columns:3; grid-rows:6; margin: 0px position: absolute img height: 278.883px; max-width: 390.283px; width: 390.283px; floatleft	Body: background-color: #222; footer background-color: #F0F0F0; font-color: #222; footer display: block; color: #555; background-color: #202121
Tablet	Remaining are same	grid-columns:3; grid-rows:6; margin: 0px; align: left; Remaining are same	background colors are remain same
Mobile	Remaining are same	grid-columns:1; grid-rows:6; margin: 0px; align: left;	background colors are remain same

Website: <http://www.wwf.org.uk>



3. Learnings

I have learned many new things by doing this project like what a responsive design is, role of responsive design in current trends and how responsive design trends changed drastically with time and evolution of mobile technology.

I closely studied and understood how the following scripts work in making a website as well as creating responsive designs. CSS, HTML5, and fluid grids, flexible images.

Bibliography

Websites:

http://www.akamai.com/dl/akamai/wp_responsive_web_design.pdf

<http://www.awwwards.org/books/Web-and-Mobile-TRENDS-2013.pdf>

<http://doit.maryland.gov/webcom/Documents/Responsive-Web-Design.pdf>

<http://www.webdesignblog.gr/wp-content/uploads/2012/03/2.pdf>

<http://www.bluehornet.com/assets/Responsive-Design-for-Mobile-Rendering.pdf>

<http://emarketing.eqtr.com/emarketing/Equator/ResponsiveDesign.pdf>

<http://www.w3.org/2013/Talks/responsive-design.pdf>

http://zomigi.com/downloads/Building-Responsive-Layouts_RWDSummit_120828.pdf

http://www.splio.com/responsive/10_basic_tips_about_responsive_design.pdf

<http://www.edb.utexas.edu/minliu/multimedia/PDFfolder/DESIGN~1.PDF>

http://www.knotice.com/whitepapers/guides/Knotice_Guide_Responsive_Design.pdf

<http://www.webdesignblog.gr/wp-content/uploads/2012/03/9.pdf>

<http://uablogs.missouri.edu/wp-content/presentations/responsive-web-design/presentation.pdf>

http://www.headfirstlabs.com/books/hf-mw/hfmw_ch2.pdf

http://omniupdate.com/_resources/pdfs/primers/responsive_design.pdf

http://planetargon.com/assets/Planet_Argon-responsive_Design_vs_Mobile_Site.pdf

<http://sicdigital.com/wp-content/uploads/2012/08/Responsive-Web-Design.pdf>

<http://www.awwwards.com/awards-of-the-day>

<http://globalnews.ca/>

<http://www.wwf.org.uk/>

<http://www.britishcouncil.org.ua/en>

<http://www.mitsubishi-motors.com.au/>