



FIT5032 Research Report



Should Internet Applications Apply Responsive Web Design

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1. Abstract

The robust development of mobile technologies has boosted massive mobile productions such as smartphones, tablets, laptops and other wearable devices. These mobile devices has different screens from traditional personal computers (PC). As the explosive growth of these devices come with different screen sizes. This new stream has modified the way how web contents are displayed and organized (F. Y. Lee, et al, 2014). This paper manly focus on Responsive Web Design (RWD) which is a novel technique used tackle the multi screens display issues. It discusses about RWD principals, tools, open issues and challenges. Moreover, this paper is finding practical RWD web applications and developments, which proposed some suggestions and guides for future works.

Keywords: Responsive, Responsive web design, Internet application, Mobile device screen, Screen optimization, CSS, web application.

2. Introduction and Literature review

As the development of mobile industry, the price of smart devices is more and more affordable, which induces the rapid proliferation of mobile devices. In the meantime, data communication technology evolves expeditiously, 4G (4th-generation mobile phone technologies) is available for an increasing number of smart devices, which propose much faster data transfer than 3G times. In this environment, many people browse web contents and watch online videos everywhere at any time, they most cannot live without smartphones. For this reason, the market requires web designers and developers have to create a consistently and integrally viewable website which enables cross vary devices with different browsers and all operating systems(F. Y. Lee, et al, 2014). One mainstream solution is “Responsive Web Design (RWD)” which allows browsers display web contents based on the device screen. The RWD was introduced by Ethan Marcotte in 2010 and published in *A List Apart*. Responsive designs create websites which adapt not only small screens but also big screens by using media queries, fluid grids and flexible page, etc. (K. FREDERICK, 2013).

This paper studies profound literatures of RWD, it would be useful for helping web designers, developers and researchers in this field learning and working RWD. K, Bohyun, 2015 explained how the RWD solves three main

problems in stand-alone mobile websites which are flexible, grid-based layout, flexible images and media queries. But he introduced a few problems in RWD, such as RWD cannot guarantee a good mobile experience, because the text in responsive websites is hard to in a legible size. What is more, changing displaying screen size may course format problems, it would break the rule of right contents display on right places. R. Fox, 2012 examined a few current methods which are used to implement RWD, such as using media queries to cater a site to ranges of screen dimensions instead of fixed ratios, he also discussed benefits about apply one site to many screens. There are some fundamental principles of RWD needs be considered on designing a responsive website from scratch, such as Foundation CSS and handy jQuery (S. Jeremy, 2015). Nancy R. Glassman & Phil Shen (2014) proposed some fantastic tools for responsive design, they are emulators, sketchbooks, calculators and CSS frameworks, etc. Baker, S. C. (2014) discussed similar topics what Nancy R. Glassman & Phil Shen did. He researched novel tools for web design in the past five years, for example HTML5 which is the latest officially version for HTML. It is applied massively because two main changes, expanded selection of elements and more specific options. CSS3 is another tool, which uses media query module.

3. Method

Identify all responsive approaches – Except RWD, there are some other approaches can fulfill responsive purposes. L. Wroblewski introduced Responsive Design + Server Side Components (RESS). Its functions performed at servers. After identifying device type and components in pages, style display contents and make it responsive. J. Nielsen, 2013 proposed another idea which is building mobile sites that can be shown to users with full sites by cutting unnecessary contents. The last two popular ideas are guidelines that can summarize website contents, and delete not important parts. One is identical to RWD, created by A. Gustafson, 2011, called Adaptive Web Design (AWD), it uses an effective coding on CSS and JavaScript to produce a website suit any devices and screens.

Compare Responsive Approaches – In the midst of those mentioned approaches, RWD is strongly suggested by Google, 2013. Google supports RWD because of considering user experience What is more, RWD has

obvious advantages over other methods except RESS. It has faster loading time than other approaches. In practical, Nielsen`s idea about cutting contents would negatively effect users` experience, once they cannot view what contents they expect to view, who would not be satisfied. As situation happened on guideline`s idea as well. The advantage of RESS is fast loading time because it removes unnecessary JavaScript from HTML which frees CPU and memory. But RESS requires more server resources, because it needs to build dynamic HTML. RWD is more efficient and reliable, which can save more time and money than RESS (J. Johansson, 2013).

Drawbacks and issues of RWD – Advertisements and videos are hard to responsive by using RWD because they are not used to match Google`s standards. One another issue is that some old version browser do no support CSS3. To fix these issues require additional patches on JavaScript libraries. The most significant problem is long loading time (C. Carlberg, 2013).

4. Results

After the overview of previous works and discuss their researches, we found that RWD is the viable solution for multiscreen display. It has more advantages than disadvantages compare to its competitive techniques. But the best solution for mobile times is using RWD with other technique together such as RESS. Which allows pages displayed responsively and cost-effective. So, nowadays, Internet application design have to be responsive in the meantime cannot cost much more than previous. In the future, RWD may only applied in web sites but also applied on any applications. There are some areas still waiting for exploring, such as best practical responsive algorithms and RWD with ASP.NET (F. Y. Lee, et al, 2014).

5. Discussion

To practical utilization, we have to discuss the planning and technology of designing a website by using RWD. Firstly, It needs to be designed a grid based on grid templates and sketch sheets, grids shown differently when switching screens.

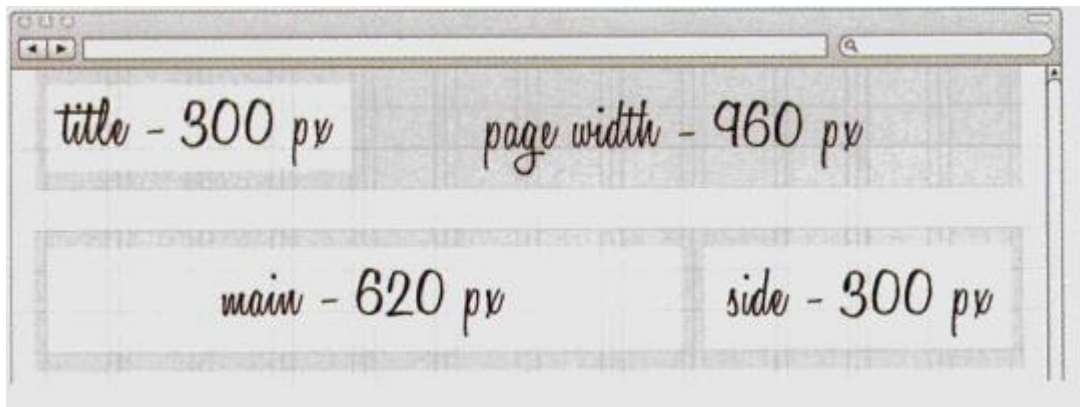


Figure 1: A 12-column, 960-pixel grid with some elements sketched in @ K. FREDERICK

Secondly, make grid fluid which displays the layout of a site using proportionate CSS values rather than fixed values.

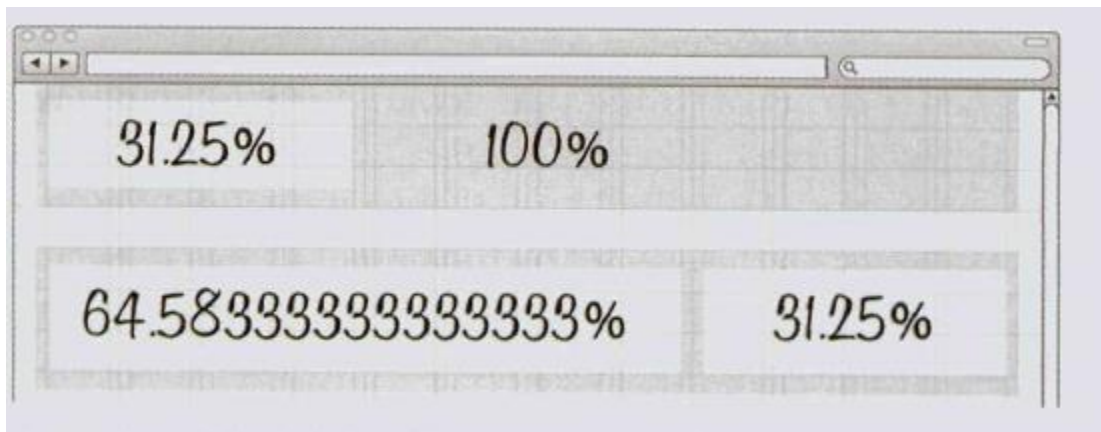


Figure 2: A 12-column, 960-pixel grid with a proportionately sized layout @ K. FREDERICK

Thirdly, create flexible page elements which extend all components such as fonts, margins, images and media. The last is set breakpoints and apply media queries. It was introduced in CSS3, uses type of media and queries to create conditional style in formatting based on the browser's viewpoint. To accomplish a RWD web application requires designers think responsively (K. FREDERICK, 2013).

```
@media only screen  
and (min-device-width : 768px)  
and (max-device-width : 1024px) {  
#main {width: 98%;}  
}
```

Figure 3: An example of media query@ K. FREDERICK

6. Conclusion

This paper researches previous work on Responsive Web Design, and analyzes those authors' discoveries about the advantages and disadvantages of RWD, other available responsive methods, and RWD's application in practice. After discussing the main ideas of responsive design and Internet environment, apply RWD on Internet application is the best solution for tackle mobile web application's displaying issues. Although there are some drawbacks and challenges still need to be fixed on RWD in the future. The trend of massively applying RWD cannot be stopped.

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