Responsive Web Design

Introduction

What problem are we trying to solve?

AHEAD
BOX
JUNCTIONS
EXPERIMENT
CONTENT

What content on what devices?

What is the answer?

Do nothing.

Keep the current fixed-width desktop site.

“If your content is not available on mobile, it does not exist to these users”

Karen McGrane

“If content is visible from a URL, it will be accessed from mobile devices.”

Brad Frost

Create a separate mobile site.

2 projects?

You are now working with more than one code base.

Who manages on-going content parity across multiple versions of the site?

Complex issues:

url redirection,
device database

New devices emerge
which fall between
two stools

Shouldn't
one piece of content
be at one url?

Users of mobile sites
Is the content different?
Am I missing something
only on the “main site”

“Avoid multiple versions of your site. Its called forking, and its a forking nightmare.”

Karen McGrane

Retrofit an existing desktop site.

Mobile Last

What content do we lose from the desktop version?

An adaptive compromise
for existing sites
e.g. Dribble

Build it from scratch

Mobile First

Responsive Web Design

Ethan Marcotte

http://alistapart.com/article/responsive-web-design

http://www.abookapart.com/

He create a unified approach using existing techniques and gave it a name.

Fluid layout +
media queries +
flexible media +
responsive thinking

Serve the same HTML to all devices.

Serve different CSS layouts, based on screen width.

Embrace the inherently fluid web.
The web does not have the constraints of print.

A Dao Of Web Design
John Allsopp, 2000

“Finally it feels like web design.
Finally we’re not designing sheets of paper that happen to be on screen”

Dan Cederholm

But, responsive design is not a silver bullet

Responsive designs
base many decisions
on screen width

We don’t know connection speed

var speed = connection.bandwidth;

There is no reliable relationship between screen size and connection speed

Mouse, finger?

Media Queries 4 tests for pointer and hover

```
@media (pointer:coarse) { .. }
```

The same width application in different contexts

Luke Wroblewski

Viewing distance?

’25 inch HD screen viewed from 8 feet’

Responsive content

We need content that works in many different layouts.

Content needs to be structured.

Static page content is structured with

HTML

Dynamic content:
merge JSON or XML
with a template
to create HTML

Need to identify
independent chunks
of content, not their
layout container

No longer working with a fixed canvas, that we fill with content.

Organise content into adaptive, reusable, flexible, coherent chunks

Clear separation between content and presentation.

Content parity

Ideally, all devices should see all content

Content should decide where breakpoints occur.

“it’s important to separate content and hierarchy from any single layout”

Trent Walton

"You cannot deliver the same site to all devices. You may be able to deliver the same content, with different layouts."

Bryan Rieger

Same content : yes.

Same layout : no.

"we create layouts from a canvas in. We need to .. create layouts from the content out."

Mark Boulton

Platform-agnostic approach to content

Platform-aware approach to UX, e.g. touch

Stephen Hay

Mobile First

Luke Wroblewski

2 CONSTRAINTS
WHILE IT'S TRUE the incredible growth of the mobile internet has been fueled by better and better devices, mobile still remains a very constrained environment. Screens are small, networks are unreliable, and people can find themselves in all kinds of situations when they pull out their mobile devices. But these constraints are not only good for business, they're good for design as well.
This is especially true if you subscribe to the adage that design is the process of gradually applying constraints until an elegant solution remains. In other words, embracing constraints (rather than fighting them) will ultimately get you to better designs.
SCREEN SIZE
Though the topic of available screen real estate on the desktop was hotly contested for many years in the web design community, we finally settled on 1024×768 pixels as our
18 MOBILE FIRST
A BOOK APART
Brief books for people who make websites
No. 6
Luke Wroblewski
MOBILE FIRST
FOREWORD BY Jeffrey Zeldman
kindle

Develop the single column mobile layout first.

Add wider layouts using media queries.

Consider using conditional loading

This forces us to make difficult decisions up-front about essential content

Make content
immediately accessible.
avoid navigation menus
that push content off
screen on mobiles.

HTML with no CSS gives you a single full-width vertical column layout

Mobile first does not have to mean one column.

There are responsive patterns that move content in from left and right.

BBC

Menu

LONDON
TUESDAY, 17 APR

WED	THU	FRI
10°C	13°C	14°C

News

Sport

iPlayer

More

Customise

BBC NEWS
UK

Cleric can be deported, says May

BBC NEWS
WORLD

Breivik boasts of Norway massacre

BBC NEWS
WORLD

Shuttle makes Washington flypast

BBC SPORT
FOOTBALL

Reading 1-0 Nott'm Forest

Off-canvas layout pattern

Change margin-left property together with CSS transition

http://jasonweaver.name/lab/offcanvas/ LukeW idea

Text

Unstlyed HTML is a mobile-first single-column flexible-grid

Web pages
are structured text
with hyperlinks

Structure text
is viewable on almost
all web devices

What is the core message if the user can only view unstyled HTML

Constraints?

- 16-24 point text
- line-height 1.4em
- 45-90 characters line
- margins at edges

EMs , REMs

EMs

A relative unit for setting font-sizes in responsive designs

EMs

The problem with EM-based font-sizes ?

EMs

The em unit is relative to the font-size of the parent.

The font-size compounds

```
body{ font-size: 62.5% }
li { font-size: 1.4em; }
```

```
<ul>
  <li>
    <ul>
      <li>
```

1.4 * 10 pixels = 14 pixels

1.4 * 14 pixels = 20 pixels

REMs

Font-size calculations are based on the root element (<body>)

REMs

REMs do not work in IE8-.

A fallback pixel rule may be required.

Need to convert CSS font-size rules from pixels to EMs.

Ethan Marcotte
formula for
converting fixed to
fluid layouts.

target/context
= result

18px <p> in 24px

18/24 = 0.75em

Context for margins and padding is calculated differently.

Layouts

We need to give up illusion of control over page layout

Existing tools make assumptions about fixed layouts:

Photoshop canvas

Fixed

No media queries

Page does not scale

960px grid

Adaptive

Media queries

Specific devices

Not fluid

Fluid

Proportional layout

EMs for typography

% for column widths

Fluid

Text columns become too wide/narrow at some widths.

Line measure 45-90 characters

Fluid grids: Floats & % widths

```
.grid {
    float: left;
    width:16%;
}
```

box-sizing: border-box;

Shrink content to accomodate changes in border and padding

FlexBox

CSS lays out items within a container along 2 axes

CSS Grid Layout Module

```
div{ grid-columns: 4em 1fr 1fr ;}
```

1 fixed width column for adverts.
2 equal dynamically sized columns

IE10+

Responsive
fluid grid +
media queries +
responsive images +
mobile-first thinking.

Media queries

The secret sauce of responsive web design

Brad Frost

The point at which a fluid layout breaks/ fails is a breakpoint.

Media queries help at the breakpoint by applying different CSS to change layout.

Media queries allow conditional CSS

If

media query is true

then

apply CSS rules

Media query tests the current state of the users' browser, e.g. screen width

Brad Frost .ISH

Define breakpoints based on content not devices.

Your first media query is the absence of a media query

Ethan Marcotte

```
@media type and
(media feature) {
    .. CSS rules
}
```

```
@media screen and
(max-width:50em) {
    .. CSS rules
}
```

```
@media screen and
(min-device-pixel-ratio:2)
{
    .. retina screen
}
```

height media queries

to test vertical size of screen

orientation media queries to test landscape or portrait mode

Use only keyword to target modern browsers

Sass breakpoint variables

```
$small : 24em;
$large : 40em;
```

Not supported
by IE6-8.
Polyfills like
respond.js may help

respond.js

Media query polyfill
for IE6-8
min-width
max-width

Conditionally serve different CSS for older browsers:

```
<!--[if (lt IE 9) -->
```

Javascript

```
if( window.matchMedia("(min-width: 40em)").matches ) { .. }
```

Test media queries with Javascript to conditionally load content.

Viewport

Safari iOS displays web pages,
on 980 pixel virtual canvas : viewport

The viewport is shrunk to fit the physical dimensions of the device

Viewport meta tag in HTML head overrides this default behaviour.

```
<meta
name="viewport"
content=
"width=device-width,
initial-scale=1.0" >
```

Media

Responsive images

Web page sizes are
getting bigger.
A large part of
the problem are images.

First, the good news..

```
img {
    max-width: 100%;
}
```

The image will scale down
to fit its container.
And the image will not scale
larger than its actual size.

But the same image is served to all devices.

Ideally we would serve
appropriate images
based on screen size
and available bandwidth

HTML does not currently have a native responsive image element.

Can solve this with
CSS background images
and
media queries..

CSS background images

```
.logo {
  background-image: url(small.png);
}

@media screen and (min-width:800px) {
  .logo {
    background-image: url(huge.png);
  }
}
```

This is not semantic HTML.
Images should be represented by image tags

Art direction

Different crops of same image for different screens

Define crop rectangles in markup, or download smaller image?

adaptive-images.com

No changes to markup.
Uses PHP, Apache server
and .htaccess settings
to serve up image.

Foresight.js

Downloads 50k test file
to judge users bandwidth
and serve
appropriate images

Javascript
responsive image
solutions?

<img id="luke" src="high.jpeg" />
Javascript

```
<img id="luke" src="high.jpeg" />
```

```
$("#luke").attr("src","low.jpeg")
```

Modern browsers pre-fetch images before building the DOM.

This interferes with attempts to modify the SRC atttribute before the page renders using Javascript.

Ideal responsive-image markup pattern ?

Picture element

Specify multiple image files.
Media query for each image.
Fallback for old browsers.
HTML5 semantics

```
<picture>
  <source src="default.jpg" />
  <source src="high.jpg"
  media="min-width: 800px" />

  <!-- Fallback -->
  <img src="default.jpg" />
</picture>
```

srcset

```
<img src="a.jpeg" alt=""
srcset=
"face1.jpeg 600w 200h 1x,
face2.jpeg 600w 200h 2x" >
```

pictureFill.js

A polyfill which emulates
<picture> tag
using a

Hidden images are still downloaded on slow mobile networks

display: none

Retina

```
@media screen and
(-webkit-min-device-pixel-ratio : 2),  {

.logo {
        background-image : url(lg@2x.png);
        background-size : 200px 200px;
```

Video

```
video {
    max-width : 100%;
    height: auto;
}
```

YouTube wraps video in iFrame.

FitVids.js makes iFrame video resizeable.

Tables

How do we display landscape tabular data on portrait devices?

Do we change table shape
or drop data?
Is the end result still
recognisable as a table?

Javascript

Modern browsers only:

window.matchMedia(mq)

Conditionally load HTML using AJAX.

Mustache

combines templates

{{ job }}

with JSON data

{ job :"Architect" }

to create HTML

 Architect

Combine JSON data with templates to create alternative layouts

employ.json

media query

template..
{{..}}

template..
{{..}}

Responsive adverts?

How do fixed-sized adverts fit into a responsive layout?

http://www.markboulton.co.uk/journal/responsive-advertising

Boston Globe turned empty DIVs on/off based on breakpoints. Populate with JS on page resize.

Performance

Average web page size

900k images,
200k Javascript

Source : http://httparchive.org

Responsive sites

86% of responsive sites send the same data to all devices

http://www.guypo.com/mobile/performance-implications-of-responsive-design-book-contribution/

Why aren't content & performance priorities on desktop version too?

“You have 5 seconds of someone’s time”

Brad Frost

“If your website is 15MB it’s not HTML5, it’s stupid. ”

Christian Heilmann

Hiding stuff won’t work

```
img{ display:none; }
```

Performance budget

Tim Kadlec

Use scalable vectors, not bitmaps, where possible.

SVG, icon-fonts.

SVG?

<svg width="40px" height="80px" ></svg>

An XML description of a scalable vector. in a small text file.

Icon fonts

Envelope Stop-watch Screen Keyboard Clock TV

```
<p>TV <span class="icon-tv"
aria-hidden="true"></span></p>

.icon-tv:before {
    content: "\e018";
}
```

Optimise bitmaps

ImageOptim

Content Delivery Netoworks (CDNs)

Conditional loading of content using Javascript and AJAX

Minification of Javascript code

Load Javascript
at the bottom of page

Review use of Javascript frameworks and libraries

Latency

Mobile networks are slower handling multiple HTTP requests

Use concatenation tools to reduce number HTTP requests

Use CSS sprites
to reduce number
HTTP requests

SVG sprites

Multiple vectors in 1 file
1 HTTP request
Scalable
Support: Modernizr.js

Workflow

Develop style guides and pattern guides, which are independent of layout

Avoid frankencomps.
Compromised design
based on static comps
introduced too early
in project.

A more iterative process

Too many screen-sizes, and interactions to use static comps.

“begin with the individual components divorced from any layout context”

Jeremy Keith

“begin with atomic units of content and style them first before thinking about layout.”

Jeremy Keith

Element collage for Entertainment Weekly

http://danielmall.com/articles/responsive-mobile-entertainment-weekly/

Pattern Primer : Jeremy Keith

This text is quoted. A of quoted text like this is particularly useful when presented as a pull-quote within an article of text.

This is an error feedback message.

This is a feedback message for the user.

Button element | Submit button

```
<!-- This was created to ensure .. -->
<blockquote>
<p>This text is quoted. A  of quoted text like this is particularly useful when presented as a pull-quote within an article of text.</p>
</blockquote>
```

blockquote.html

```
<div class="feedback error">
<p>This is an error feedback message.</p>
</div>
```

feedback-error.html

```
<div class="feedback">
<p>This is a feedback message for the user.
</p>
</div>
```

feedback.html

```
<button>Button element</button>

<input type="submit" value="Submit button">
```

Rendered HTML using shared CSS

HTML code

Avoid tight coupling between structured content and 1 specific layout

Let content decide breakpoints (media queries) not devices.

Testing

WEINRE

WEb INspector REmote (Adobe Edge Inspect)

Remote debugging using Opera and Opera Mobile Emulator

http://www.opera.com/dragonfly/documentation/remote/

Remote debugging using Safari

MIHTool

Adds developer tools to iPad browser

Summary

John Coumbe

@johncoumbe