Quality Assurance for Mobile Developers

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What is a bug?

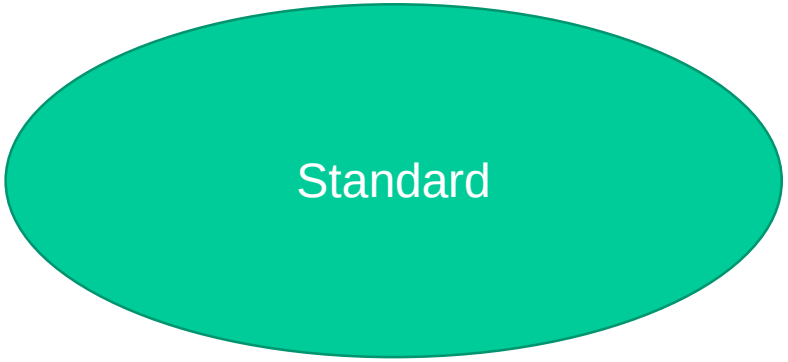
What is a bug?

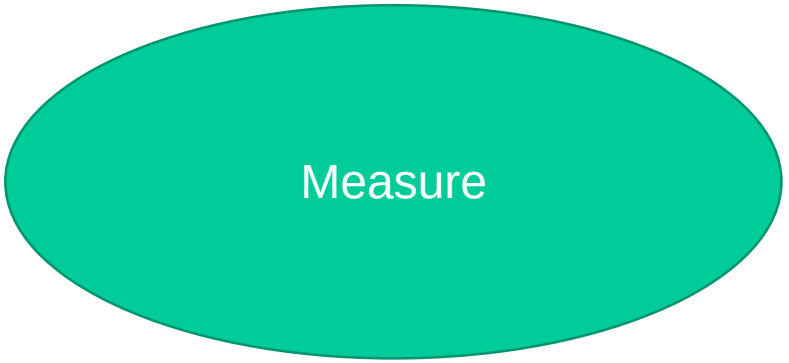
- Anything that causes an unnecessary or unreasonable reduction of the quality of a software product [Cem Kaner and James Bach]
- A bug is anything about the product that threatens its value [James Bach and Michael Bolton]
- A bug is something that bugs somebody [James Bach]
- Failure to meet reasonable expectations of a user [Ed Myers]

What is a quality?

What is quality?

- Conformance with requirements [Philip Crosby]
  - Requirements may or may not be written down
- Quality is value to some person [Gerald Weinberg]
- Quality is fitness for use [Joseph Juran]
  - Customer satisfiers and dissatisfiers





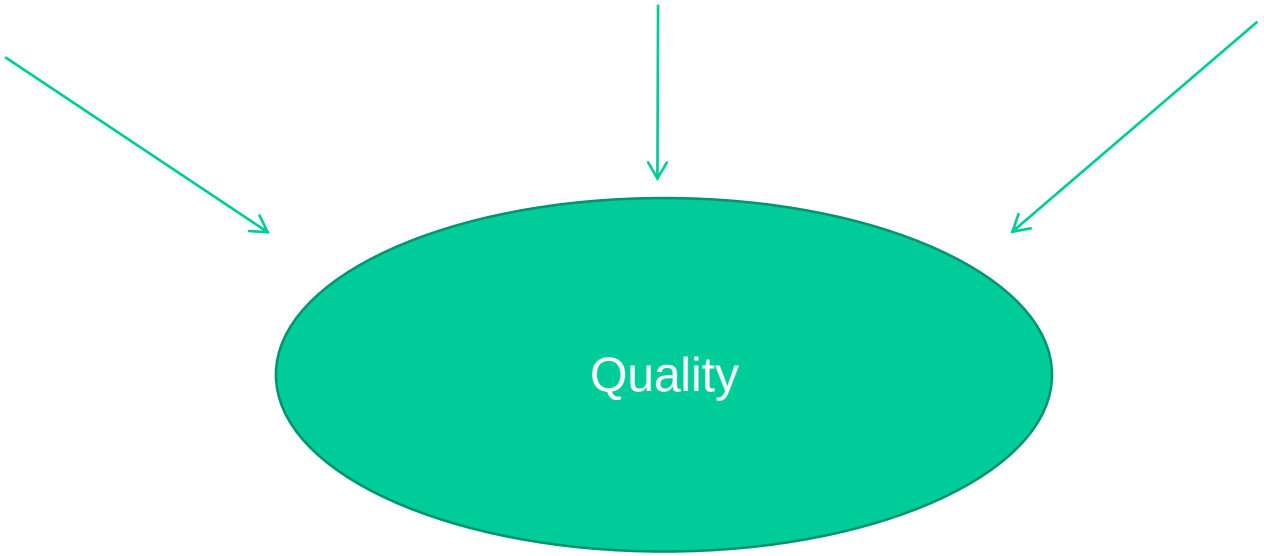
What is quality?

- The totality of features and characteristics of a product that bear on its ability to satisfy a given need [American Society for Quality (ASQ)]
- The total composite product and service characteristics of marketing, engineering, manufacturing and maintenance through which the product and service in use will meet expectations of the customer [Armand V. Feigenbaum, Total Quality Control, Fortieth Anniversary Edition]

Quality is Subjective

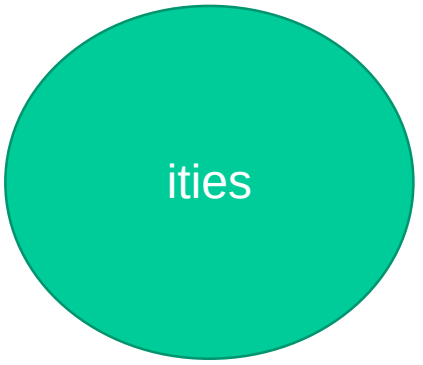
Quality for …?

Customer, user, marketing, customer service, technical writer, manager, developer, designer, UI designer, testers…



Quality is Multidimensional

- Reliability
- Usability
- Maintainability
- Testability
- Scalability
- Functionality / capability
- Speed of operation
- Localizability
- Documentability
- Trainability
- Technical-supportability
- …



What is software quality assurance?

- The planned and systematic activities implemented in a quality system so that quality requirements for a product or service will be fulfilled [American Society for Quality (ASQ)]
- All the planned and systematic activities implemented within the quality system, and demonstrated as needed, to provide adequate confidence that an entity will fulfill requirements for quality [American National Standard (ANSI/ASQC A8402-1994)]
- (1) A planned and systematic pattern of all actions necessary to provide adequate confidence that an item or product conforms to established technical requirements.
- (2) A set of activities designed to evaluate the process by which products are developed or manufactured.
- [IEEE Standard 610.12-1990]

Quality assurance

- Verification - *Are we building the product right?*
  - Focus: documents, practices
  - Possible activities: reviews (walkthrough and inspection), meetings
  - Possible outputs: documents, checklists
- Validation - *Are we building the right product?*
  - Possible activities: testing
  - Possible outputs: bug reports

What is testing?

What is testing?

- “A technical investigation of the product under test conducted to provide stakeholders with quality-related information.” [Cem Kaner, James Bach]

Testing

- **Black Box Testing**
  Testing software without any knowledge of the underlying code or internal structure of the program.
- **Acceptance Testing**
  Testing performed by the customer or a representative of the customer in order to approve the system to go live
- **Alpha Testing**
  Testing in the lab
- **Beta Testing**
  Testing by end users

Testing

- **Functional Testing**

  Testing that focuses on the observable behavior of a software and looks at the program as a collection of functions / features

- **Glass Box Testing / White Box Testing**

- Testing with knowledge of the underlying code

- **Programmer Testing**

  Testing when programmers test their own code or the code they maintain

- **Negative Testing**

  Testing using invalid inputs to test a program's error handling

Testing

- **Performance testing**

  Testing conducted to evaluate the compliance of a system or component with specified performance requirements (Term often used interchangeably with 'stress' and 'load' testing)

- **Parafunctional Testing**

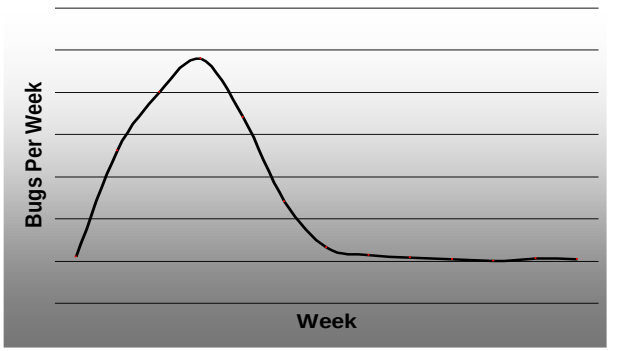
  Testing inspired by the quality requirements (ities)

- **Regression Testing**

  To test revised software to be sure that previously working functions were not impacted

Fundamental questions in testing

- Why are you testing? What are you trying to learn?
  - ***Mission of testing***
- How should you organize your work to achieve your mission?
  - ***Strategy of testing***
- How will you know whether the program passed or failed the test?
  - ***Oracles***
- What would it take to do a complete testing job?
  - ***Impossibility of complete testing***
- How much testing is enough?
  - ***Measurement and stopping testing***



Exercise

- Test the ProSum software
- Mission: Late development to release the software

What is a good tester?

- “The best tester isn’t the one who finds the most bugs or embarrasses the most programmers. The best tester is the one who gets the most bugs fixed.” TCS 2.0

- “The best tester isn’t the one who finds the most bugs or embarrasses the most programmers. The best tester is the one who gets the **right** bugs fixed.” TCS 3.0

Bug reporting

- Bug advocacy = Selling bugs
  - The art of motivating and convincing developers to fix bugs and removing objections

- « ***Feature:*** *A* bug *as described by the marketing department* » — (*Apple II Reference Manual*, Apple Computer Inc., Cupertino, 1979, p. 180)

Bug report format

- Bug title – brief, concise but detailed description of bug
- Environment – hardware/software version
- Bug description – describe the bug in detail
  - Summary of bug
  - Steps to reproduce the bug
- Expected result/actual result: note expected behavior of software as designed and what actually happened that deviates from the specifications
- Percentage of reproduction – how often this bug occurs and can be reproduce with the step by step procedure
- Severity of bug – critical, high, medium, low – could be debatable
- Error messages, logs, screenshots, videos

Sample bug report

- Video playback - Playlist – next video on the playlist does not play automatically
- Phone: Samsung Galaxy S4
- OS version: Android 4.2.1
- Software version: 1.3
- Functionality: Video/playlist
- Priority: High
- Summary: When playing a video in a playlist, after a video ends, the next video on the list does not start playing automatically. The video window shows a black screen.

Sample bug report

Steps to reproduce:

1. Create or select an existing playlist with at least 2 videos
2. Select any video that's not the last on the playlist
3. Tap on play button to start playing video
3. Let the video play until it finishes

Sample bug report

Expected result:

The next video on the playlist begins playing automatically

Actual result:

The video window shows a black screen and the next video on the playlist doesn't start playing automatically

Reproduced 4 out of 4 times (100%).

Bad bug reports

- “App crashes”
- “Game should work”
- “It slows down my computer”
- “Does not fill up the entire screen”

Vague descriptions are not useful

Always provide steps to reproduce issue so developers can investigate

Tips

- Search database to make sure that the bug is not already reported by other testers
- Title should tell readers right away what's wrong – reduce time for everyone
- Provide relevant details and steps so developer or other testers can reproduce the issue
- Be specific
- Keep reports simple
- Proofread and edit reports

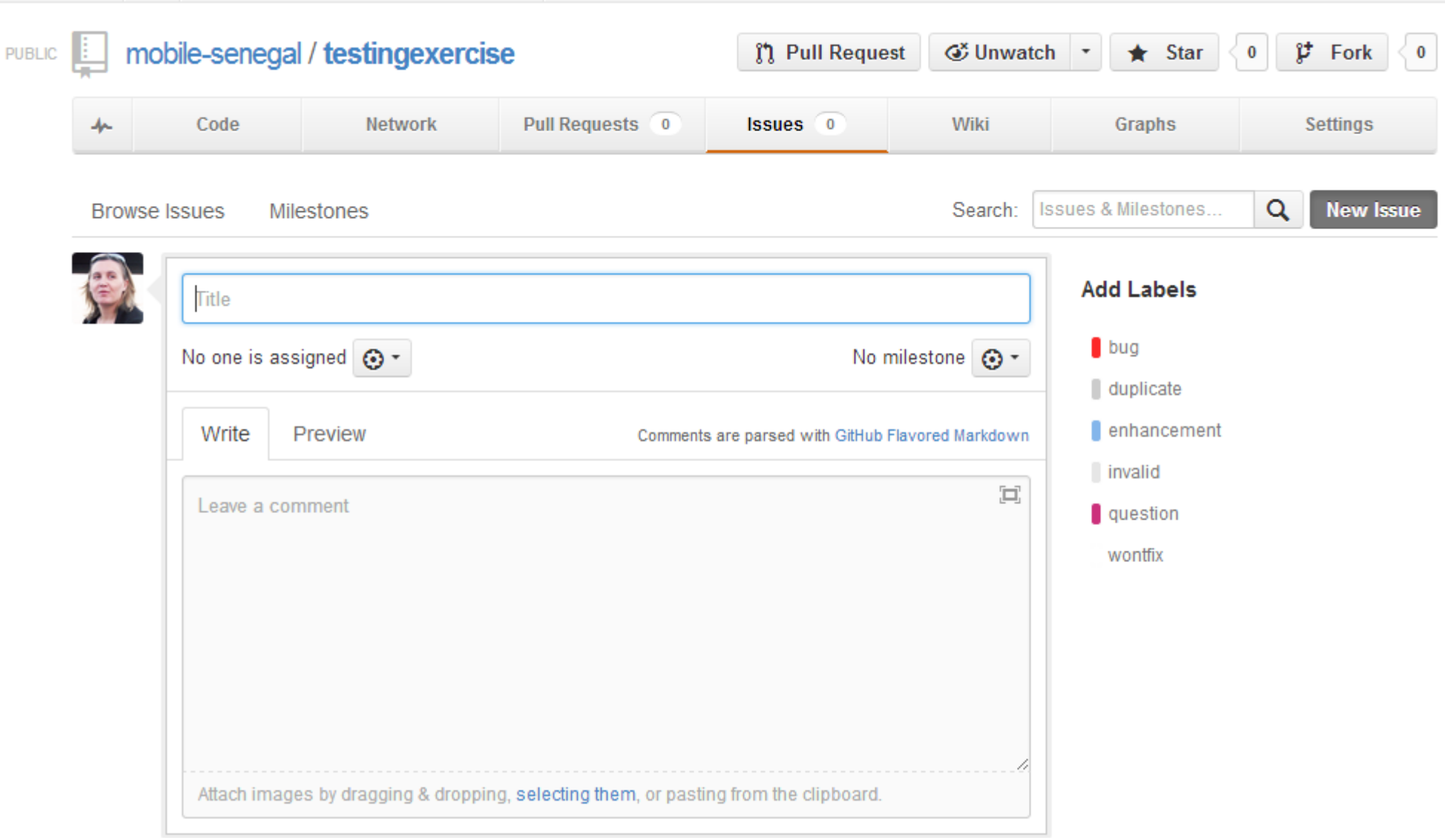
Actual bug report guidelines & reports examples

- https://developer.mozilla.org/en-US/docs/Mozilla/QA/Bug_writing_guidelines
- http://www.chromium.org/for-testers/bug-reporting-guidelines
- https://issues.apache.org/bugwritinghelp.html
- http://www.webkit.org/quality/bugwriting.html

Tools

- Video screen captures
  - Wink - www.debugmode.com/wink
  - Camstudio – www.camstudio.org
- Screenshots on mobile devices
  - No Root Screenshot It! App - for Android and iPhone phones
  - iPhone and some Android phones have the possibility to do screenshots by using special key combinations

A tour of GitHub for issues



Exercise

- Submit a bug report for ProSum in GitHub

A little more about mobile testing

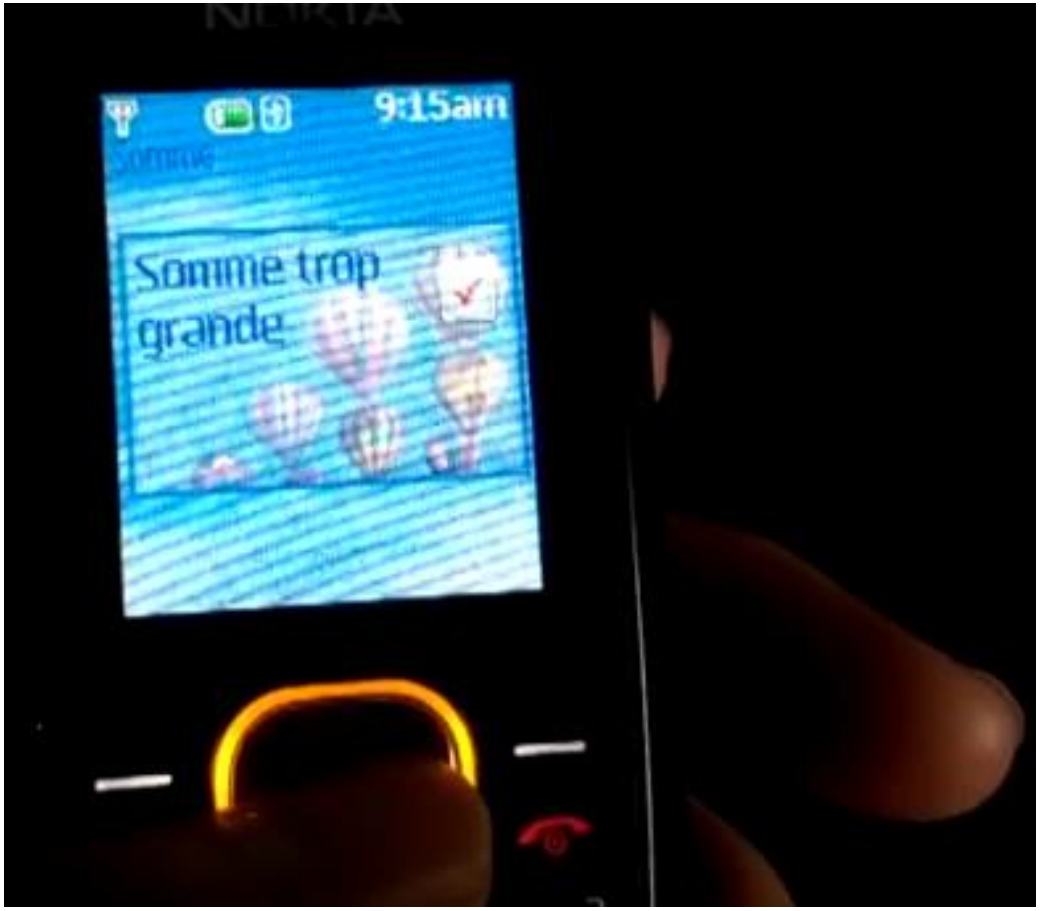
What makes testing different?

What additional considerations are there?

Crucial question in mobile testing

- What devices should we test with?
  - Know your usage statistics
- How to acquire those devices?
  - Buy them
  - Borrow them
  - Be part of developer programs to have access to them
  - Use remote device access
- Can we use and trust emulators?
  - No

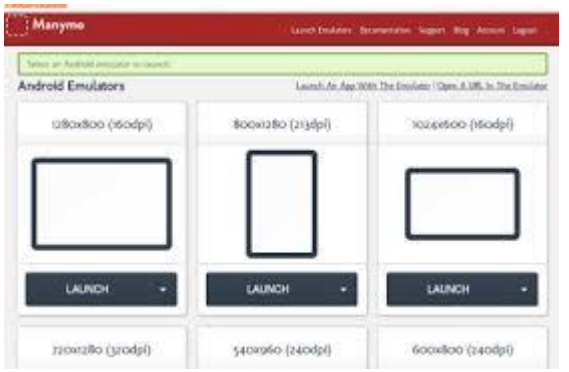
Mobile testers



Devices and emulators

- Devices and mobile browsers emulators
  - From SDKs and tools for developers
- Remote device access

keynote | DeviceAnywhere The #1 Mobile Testing Platform | NOKIA Developer



Testing mobile apps

- Testing in real situations (mobile user)
- Installation
- Configuration (OS, app permissions, device settings, carrier)
- Connectivity (intermittent, off)
- Security (SSL, login)
- Navigation (rotation, scrolling, filters)
- Mobile interruptions (phone calls, SMS)
- SD and SIM cards (removing, changing)
- Location (on/off)
- Battery and power supplies (low battery, removing battery)
- UI / UX (search, text entry, images, videos, forward/backward, zoom/pinch)
- Outbound situations
    - Extensions of the web site and activities outside of the web site itself (forgotten password, external apps calls such as QR code readers for example)

Testing a mobile web site

Mobile Web Best Practices

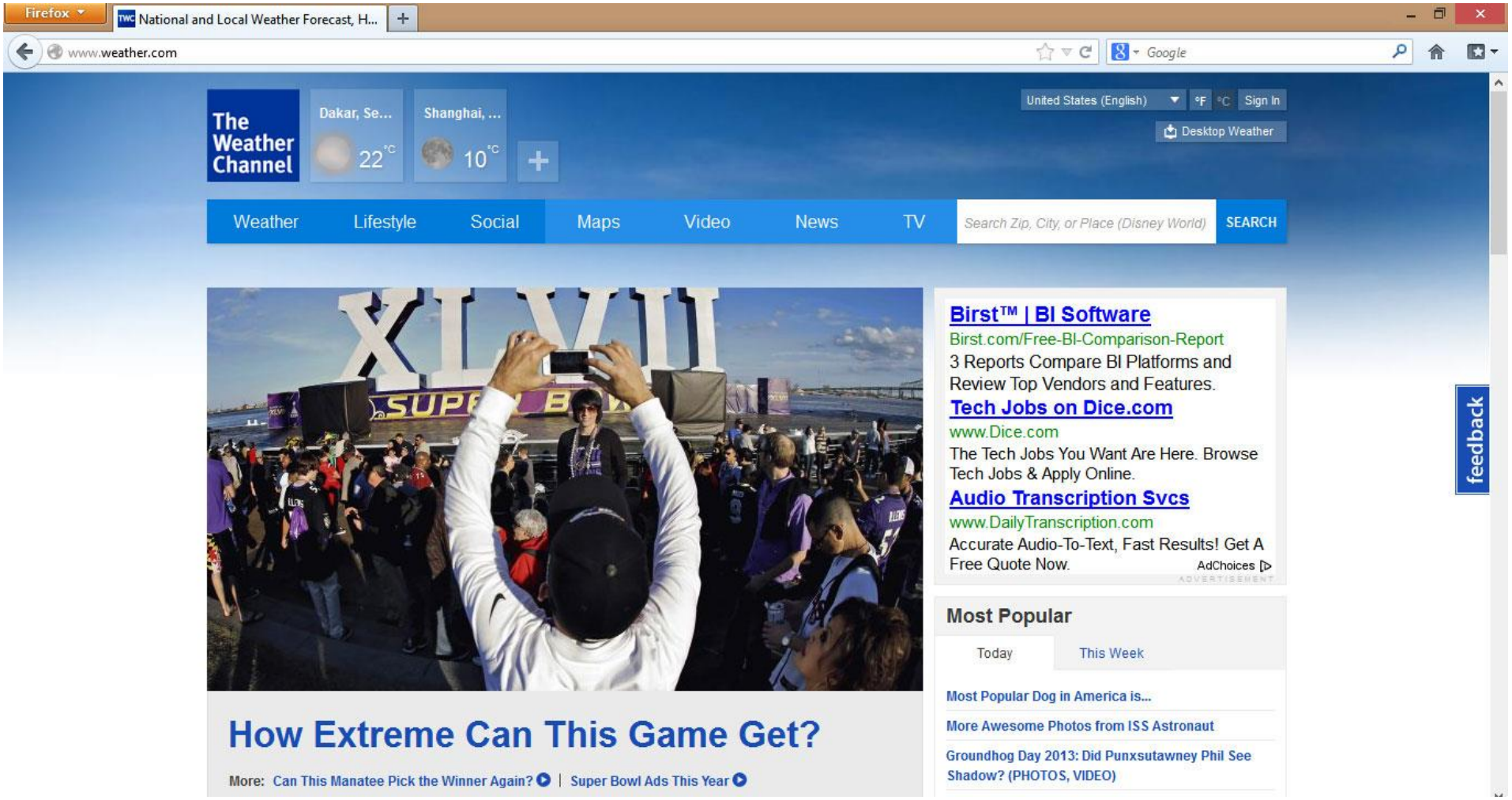
W3C Mobile Web Initiative

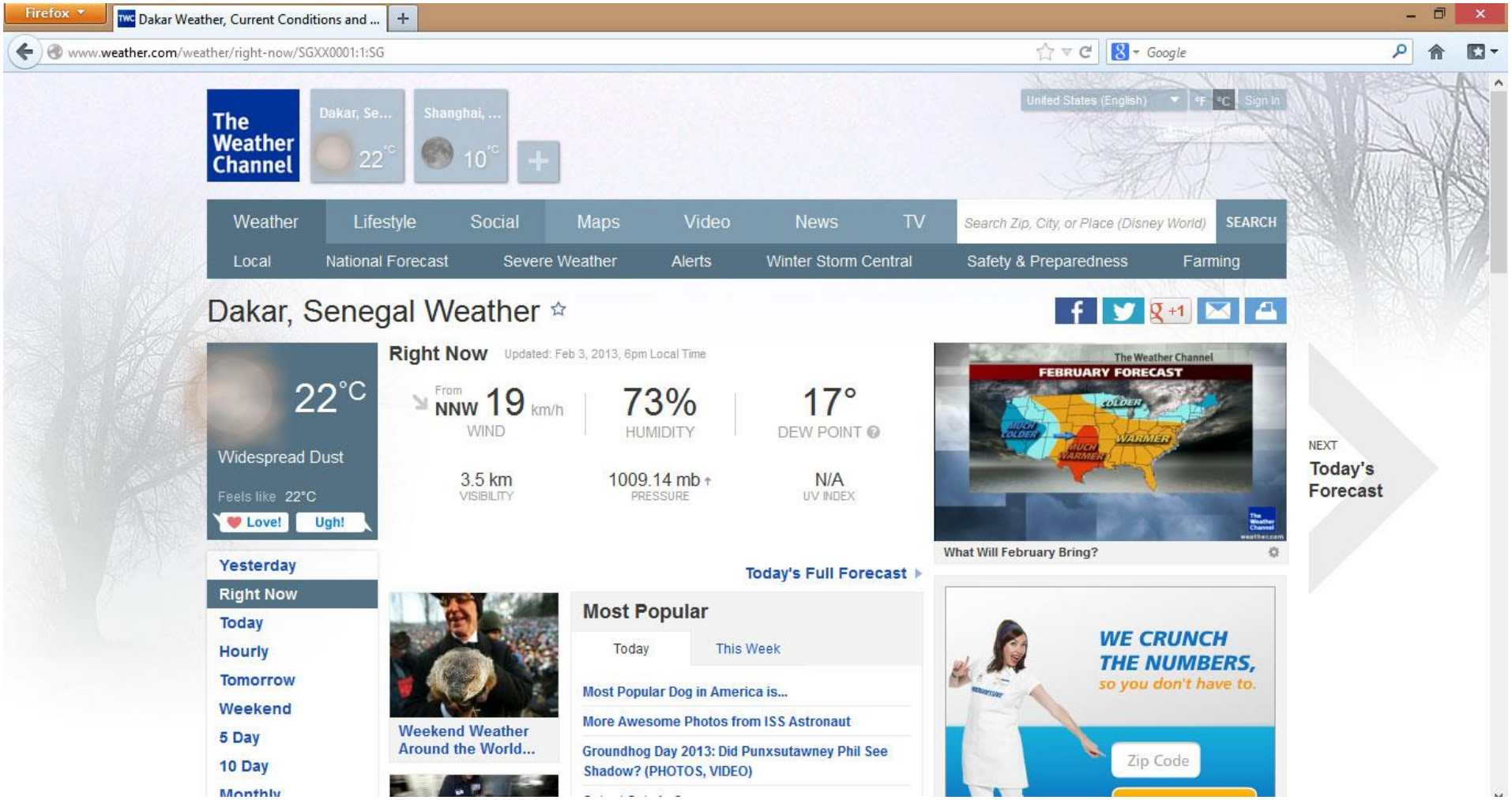
10 ways to mobilize

- **Design** for One Web
- **Rely** on Web standards
- **Stay away** from known hazards
- **Be cautious** of device limitations
- **Optimize** navigation
- **Check** graphics & colors
- **Keep** it small
- **Use** the network sparingly
- **Help & guide** user input
- **Think** of users on the go

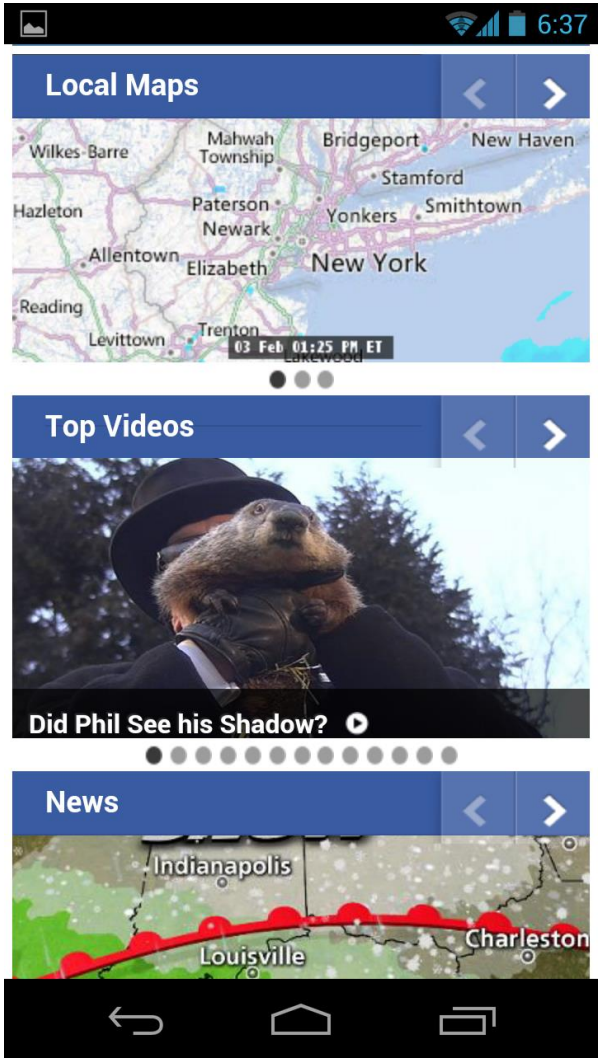
http://www.w3.org/2007/02/mwbp_flip_cards.pdf

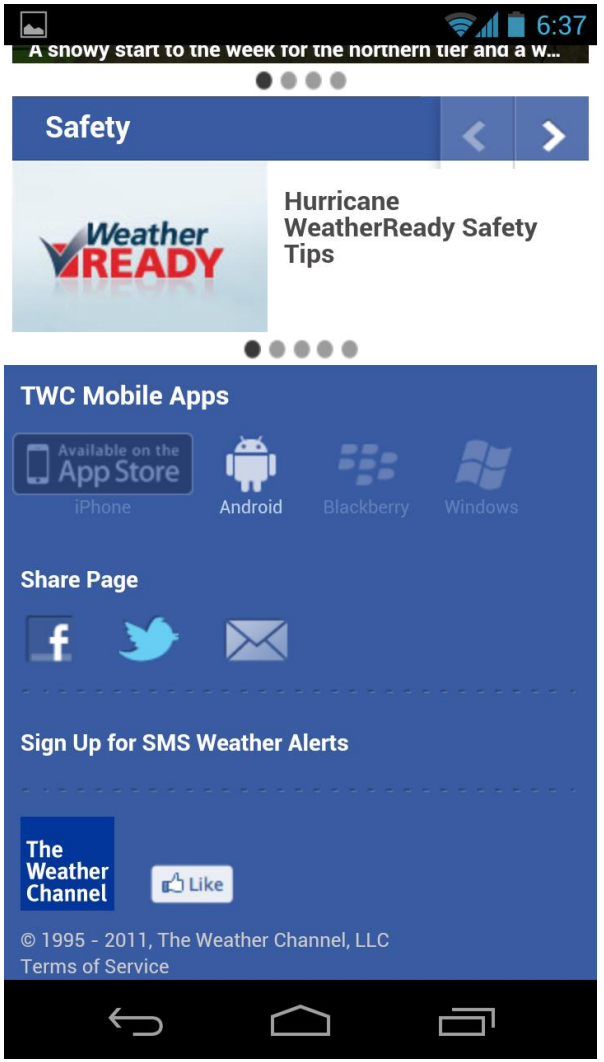
http://weather.com



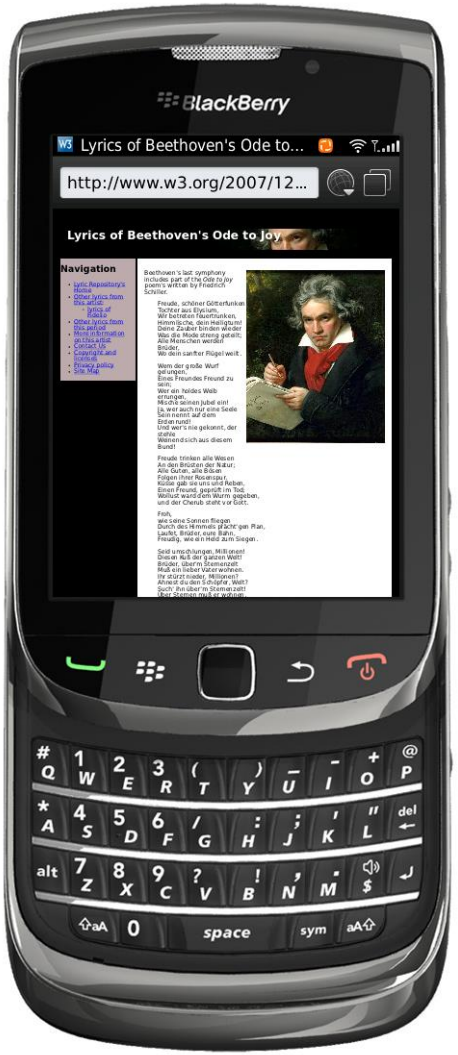

Firefox
Dakar Weather, Current Conditions and ...
www.weather.com/weather/right-now/SGXX0001:1:SG
Google
The Weather Channel
Dakar, Se... 22°C
Shanghai, ... 10°C
United States (English)
°F °C
Sign In
Weather
Lifestyle
Social
Maps
Video
News
TV
Search Zip, City, or Place (Disney World)
SEARCH
Local
National Forecast
Severe Weather
Alerts
Winter Storm Central
Safety & Preparedness
Farming
Dakar, Senegal Weather
22°C
Widespread Dust
Feels like 22°C
Love!
Ugh!
Right Now
Updated: Feb 3, 2013, 6pm Local Time
From NNW 19 km/h
WIND
73%
HUMIDITY
17°
DEW POINT
3.5 km
VISIBILITY
1009.14 mb
PRESSURE
N/A
UV INDEX
Today's Full Forecast
Yesterday
Right Now
Today
Hourly
Tomorrow
Weekend
5 Day
10 Day
Monthly
Weekend Weather Around the World...
Most Popular
Today
This Week
Most Popular Dog in America is...
More Awesome Photos from ISS Astronaut
Groundhog Day 2013: Did Punxsutawney Phil See Shadow? (PHOTOS, VIDEO)
The Weather Channel
FEBRUARY FORECAST
COLDER
MUCH COLDER
WARMER
MUCH WARMER
What Will February Bring?
NEXT
Today's Forecast
WE CRUNCH THE NUMBERS,
so you don't have to.
Zip Code

6:35
m.weather.com/right_nov
The Weather Channel
New York, NY
Echographe clinique hôpitaux Rayon X CIF Dakar
Now
Hourly
36 Hour
10 Day
New York, NY
32°F
FEELS LIKE 32°F
Cloudy
SHARE ON FACEBOOK
Updated: Feb 3, 2013, 1:25pm EST
FORECAST DETAILS
Local Maps
Wilkes-Barre
Mahwah Township
Bridgeport
New Haven
Stamford


6:37
Local Maps
Wilkes-Barre
Mahwah Township
Bridgeport
New Haven
Stamford
Hazleton
Paterson
Newark
Yonkers
Smithtown
Allentown
Elizabeth
New York
Reading
Levittown
Trenton
03 Feb 01:25 PM ET
Top Videos
Did Phil See his Shadow?
News
Indianapolis
Louisville
Charleston

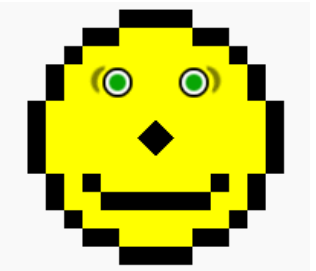

6:37
A snowy start to the week for the northern tier and a w...
Safety
Weather READY
Hurricane WeatherReady Safety Tips
TWC Mobile Apps
Available on the App Store
iPhone
Android
Blackberry
Windows
Share Page
Sign Up for SMS Weather Alerts
The Weather Channel
Like
© 1995 - 2011, The Weather Channel, LLC
Terms of Service

What do you think?



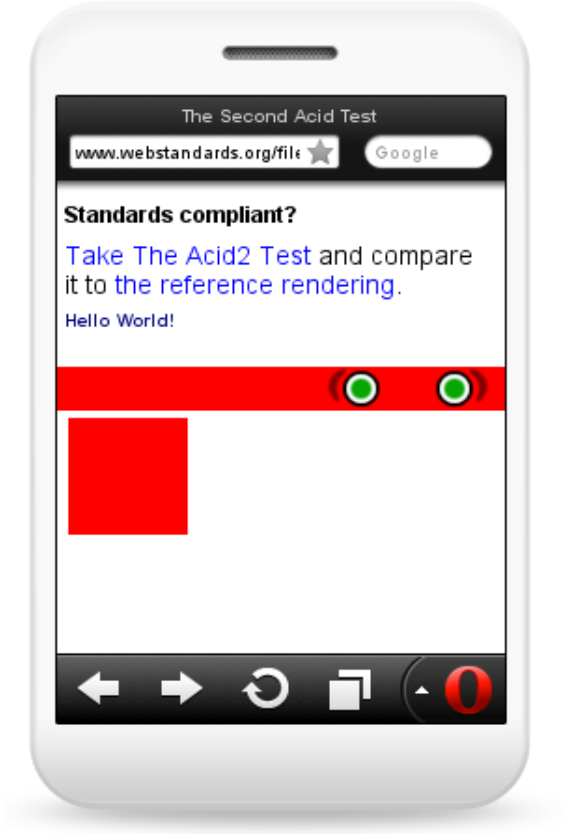
Try out http://www.w3.org/2007/12/training/assignments/basicdesign/sample.html in different browsers.

ACID Test



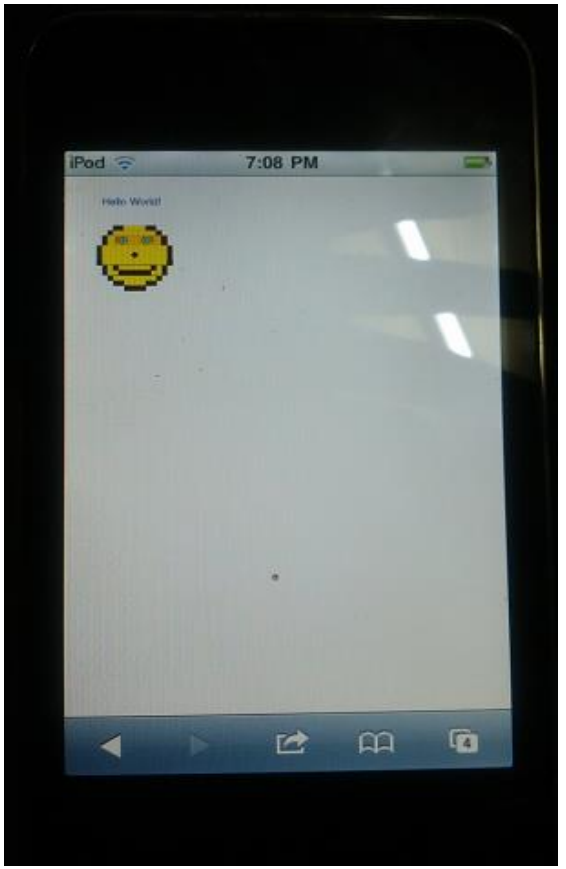
- Test page published and promoted by the Web Standards Project to expose web page rendering flaws in web browsers
- ACID 2
  - http://www.webstandards.org/files/acid2/test.html#top
  - HTML markup, CSS 2.1 styling, PNG images, and data URIs
- ACID 3
  - http://acid3.acidtests.org
  - DOM and JavaScript

CSS support



Opera Mini

Android on Google Nexus



iPod Safari

Testing mobile web sites

- It is a web site!
- Test in real situations (mobile user, screen rotation…)
- Test with different browsers
- Performance
- Images and videos
- Security (login, SSL)
- HTML pages (lists, tables)
- Redirections
- Outbound operations

Tools

- W3C Markup Validator http://validator.w3.org/
- CSS Validator http://jigsaw.w3.org/css-validator/
- Link Checker http://validator.w3.org/checklink
- Mobile web performance http://mobitest.akamai.com/m/index.cgi
- Mobile ready? http://ready.mobi
- Google Chrome, Opera and Safari include some tools for developers

Exercise

- Testing of a news web site
- Describe your strategy to test this mobile web site and 5 problems

seneweb.com
Le Sénégal dans le Web!

DIDACTIKA
éveil & découvertes

ACTUALITÉS | BLOGS NOUVEAU!!

À LA UNE DU JOUR

DÉPÊCHES LES + LUS LES + COMMENTÉS

PEOPLE Video. Voici La Toute Nouvelle Danse De Salam Diallo "gicoulou"

0 Commentaires | Seneweb People | Salam Diallo

POLITIQUE La Famille Est Un Ennemi En Politique : La Leçon De Senghor Aux Hommes Politiques

3 Commentaires | Xamle.net | senghor

Opera Mobile - HTC ...
Seneweb.com : Le Senegal Dans le Web!
www.seneweb.com/
Google
HTC Sensat 540x960 PPI: 253 50%

Opera Mobile - HTC ...
Seneweb Mo...
Po Le PM appelle au respect des délais de livraison des logements sociaux
Po Video. Voici la toute nouvelle danse de Salam Diallo "Gicoulou"
Po La famille est un ennemi en politique : La leçon de Senghor aux hommes politiques
Po Zarko, Lutteur : « Ce qui me lie à Ndèye Guèye»
Po Ziguinchor : 12 démineurs enlevés par des hommes armés à Kaylou
Po Amsatou Sow Sidibé: «Il est temps que 'Benno bokk yakaar' soit évalué pour corriger les imperfections et insuffisances»
Po RELANCE - Après la victoire de Malick Niang sur Sa Thiès : La lutte avec frappe renaît à Yoff
Po Mbaye Leye: Le Sénégalais rate un penalty et gifle son coéquipier en plein match !
Po La vidéo qui redonne foi dans l'humanité (et dans les Russes)
HTC Sensat 540x960 PPI: 253 50%

mobiReady

YOU ARE HERE: home > page results

Username:
Use your mobiFo

Page results

URL tested: seneweb.com

seneweb.com

2

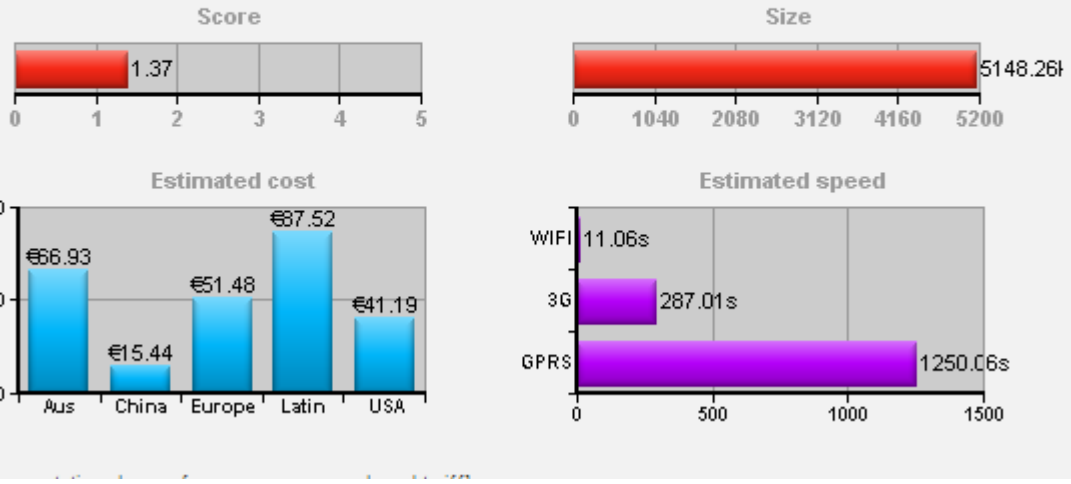
Overall

BAD

It will probably display very poorly on a mobile phone.

Your mobi.readiness score is calculated from the results displayed below. Failing tests and large page sizes both lower the score. Read through the report to understand how to improve your score - and your site.

Readiness, Size, Time & Cost



Test summary

9 Passes | 4 Warnings | 13 Fails | 2 Comments

Dotmobi compliance tests

(Click name of tests to see more detail in the panel below)

- XHTML Mobile Profile
- No frames
- Valid Markup

No frames

help me fix it

THIS TEST FAILED

Your page uses frames

Do not use frames as many mobile devices do not support them and because they cause a number of usability problems

```
FAIL near line 327 column 1
<iframe src="http://fls.doubleclick.net/activityi;

FAIL near line 1480 column 234
amp;header=true&amp;height=287" scrolling="no" fra
```

Additional tests

(Click name of tests to see more detail in the panel below)

- MIME types
- Character encoding
- Pop up windows
- Alt texts
- Image maps
- Specify image sizes
- Measures
- Page title
- Use of stylesheets
- Stylesheets dependency
- Objects or scripts
- Auto refresh
- Redirection
- Default input mode
- Provide defaults
- Page size limit
- Large graphics
- Tables
- Nested tables
- Tables for layout
- Access keys
- Caching
- External resources
- Structure
- Image Resizing
- Google sitemap
- Form submit buttons
- No transform

MIME types

help me fix it

WARNING FOR THIS TEST

Incorrect or missing MIME types were detected

The MIME types sent by servers give very important information to browsers as to how to treat a document. If incorrect MIME types are sent with a document, it may prevent the browser from correctly interpreting the document and failing to render a document.

For XHTML-MP, the recommended MIME type is `application/vnd.wap.xhtml+xml` or `application/xhtml+xml`. Unlike HTML, XHTML-MP should not be served as

Mobitest

Mobile Performance Results for:

http://seneweb.com

on iPhone 4, iOS 5.0

Your website's results:

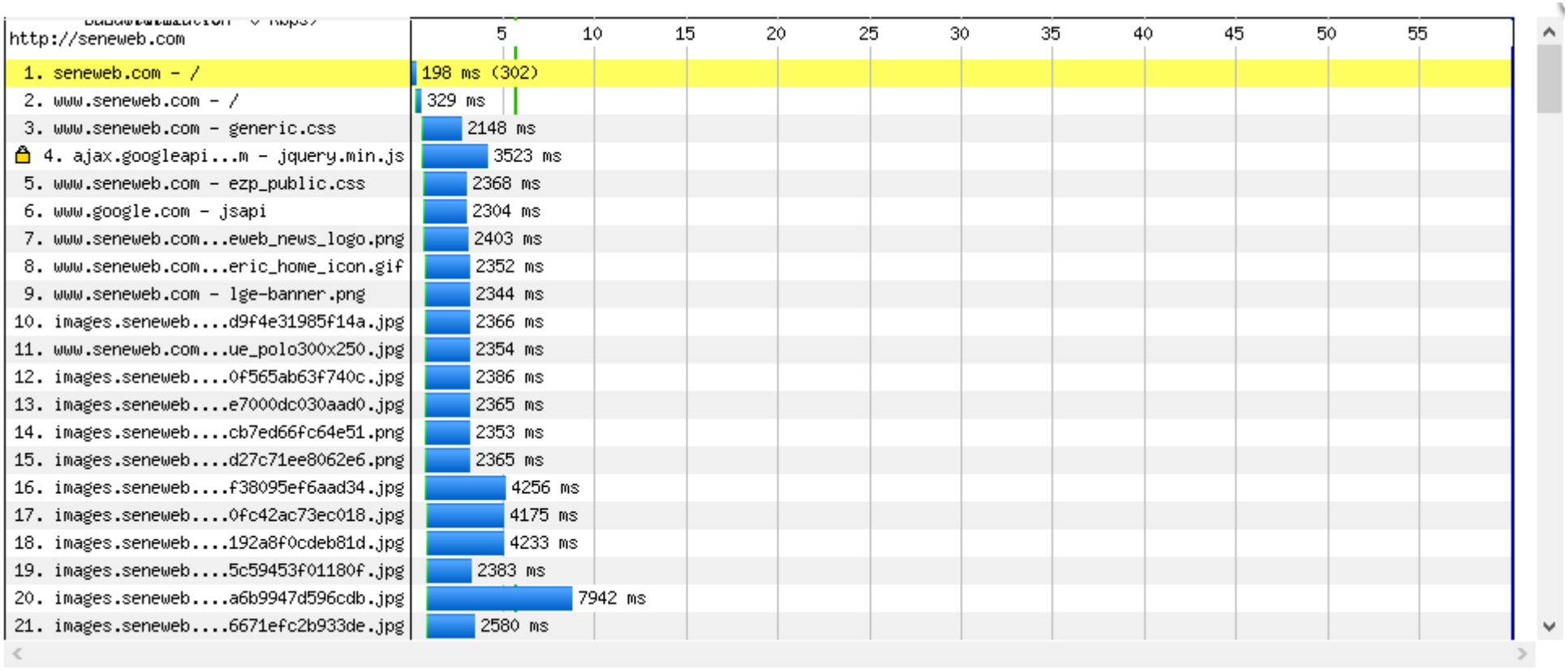
Average Load Time	Average Page Size
60.00s	5837.69kb

Facebook Tweet ShareThis

View HAR file

Register Now

Already Registered?


http://seneweb.com
5
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30
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45
50
55
1. seneweb.com - /
198 ms (302)
2. www.seneweb.com - /
329 ms
3. www.seneweb.com - generic.css
2148 ms
4. ajax.googleapi...m - jquery.min.js
3523 ms
5. www.seneweb.com - ezp_public.css
2368 ms
6. www.google.com - jsapi
2304 ms
7. www.seneweb.com...eweb_news_logo.png
2403 ms
8. www.seneweb.com...eric_home_icon.gif
2352 ms
9. www.seneweb.com - lge-banner.png
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4175 ms
18. images.seneweb....192a8f0cdeb81d.jpg
4233 ms
19. images.seneweb....5c59453f01180f.jpg
2383 ms
20. images.seneweb....a6b9947d596cdb.jpg
7942 ms
21. images.seneweb....6671efc2b933de.jpg
2580 ms

Crowdsource testing

- Testing done by a large group of testers recruited from the crowd that are not part of the development team
- Recruit testers globally – useful when a developer needs to test software designed for local audience but lacks resources to hire people on the ground
- Always have large pool of testers available
- Offers fresh perspective
- Get feedback from regular end users
- Covers a large set of devices and operating systems
- Quick turnaround time
- Reduce need to have a full time QA staff

Crowdsource testing companies

- Examples of crowdsource testing companies
  - uTest – www.utest.com
  - pay4bugs - www.pay4bugs.com
  - 99test – 99tests.com
  - Usertesting – usertesting.com

uTest

- Business model
  - Offer testing services such as functional testing, security testing, load testing, localization testing, usablility testing
  - Client demands a particular type of testing to be done within a set time period
  - People sign up with the company to become a tester – anyone can join
    - Provide hardware and software profile – e.g. computer OS version, iPhone, Nokia, BlackBerry
    - Take a qualification exam
    - If pass, get email notifications on new testing projects

uTest

- Testers get paid by each bug report or test plan
- Testers are ranked by quality of bug reports they submitted and how they compared to other testers
  - Report quality rated by lead tester or project manager
  - Higher ranking gives tester more projects and better pay

References

- Thanks to Chun Hei Cheung
- http://www.testingeducation.org/BBST/